

HARBRACE
TEACHING
TESTS



TO ACCOMPANY

YOU AND SCIENCE

NEW EDITION

CURRICULUM

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161
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1960
tests
A

FORM
A

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HARBRACE
TEACHING
TESTS



PREPARED BY THE
HARCOURT, BRACE
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TO ACCOMPANY

YOU AND SCIENCE

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*Edge
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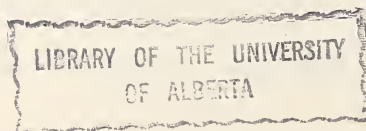
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A Note to Teachers

The tests in this booklet, **Form A**, have been prepared to appraise the progress of students taking a course in general science in schools using *You and Science*, New Edition, as a text. An alternate test booklet, **Form B**, identical in format, is available. The Chapter and Unit tests in both booklets test the same concepts developed in the text. In each test, the items in **Form A** are balanced in difficulty with the items in **Form B** so that equivalent scores can be made on comparable tests in **Form A** and **Form B**.

The tests in both booklets, **Form A** and **Form B**, are detachable and consist of the following kinds:

1. Chapter Tests. Each test provides 20 multiple-choice items to test mainly recall of facts, generally in relation to the concepts presented and developed in the text. From two to four items test the ability of students to make interpretations from the facts or evidence available to them; these items are somewhat more challenging.
2. Unit Tests. Seven longer tests are provided to cover a broad area of study—the several chapters in a unit which develop a single theme. Each of these unit tests consists of 40 items; the same type and distribution of test items occur in these tests as in the chapter tests. There is no Unit Test for Unit 1, as explained below.
3. Tests of Interpretation. Four 20-item tests of interpretation are provided; one following the chapter tests for Unit 1, and one following each of the unit tests for Units 4, 6, and 8. The items in these tests of interpretation are grouped into 4 sections and are intended to test the student's ability to interpret charts or graphs, read with comprehension, apply information in new situations, organize data, and solve problems.

The first Test of Interpretation, occurring after Chapter 2 of Unit 1, takes the place of a Unit Test. It will be noted that Chapter 1 of the text gives the students a notion of the methods of science and that Chapter 2 gives students a notion of how they learn. Each student, however, best learns the methods scientists use by participating in the work of science; and he learns best by the act of learning. The areas with which the first two chapters are concerned are practiced and tested throughout the course. One outcome of a good course in science is the ability to interpret facts, theories, hypotheses, opinions, and superstitions and to draw conclusions in the laboratory and classroom. The student is therefore introduced, at the end of Unit 1, to a Test of Interpretation.

This first Test of Interpretation may be used early in the term to determine a student's understanding of the methods of scientists and to evaluate his ability to use these methods and approaches in solving problems. This test may give you a clue to the science experiences a student lacks and enable you to plan special experiences to enlarge his capacity to do work in science.

Later tests of interpretation then enable you to discover what progress he is making in his ability to apply the methods of science. Ability to grasp the concepts of science and ability to use the methods of scientists develop at different rates in different students. We therefore suggest that scores made on these tests of interpretation not be considered a part of every student's achievement record. They should be used instead to discover and encourage developing abilities.

These three types of tests, Chapter Test, Unit Tests, and Tests of Interpretation, are a part of a total program of appraisal of learning provided by the textbook, *You and Science*, New Edition; the accompanying booklet of classroom exercises and science experiences, *Experiences in Science*, Third Edition; and the Teacher's Manual and Resource Guide, which describes this total program and which is available to teachers on request.

You may use the two forms in a variety of ways. For instance, **Form A** may be used in one year and **Form B** in another. Or you may prefer to use **Form A** with one division of a class and **Form B** with another. Although the greatest care has been taken to make one form comparable to the other, students may feel more secure if the same form is used with them throughout the study of any single unit.

Forms A and **B** may be used in the same class for different purposes. For example, after the relevant chapter or unit has been taught, the test may be given to discover concepts that have not been learned; then, after a review of the test and reteaching where needed, the other form may be given to determine if there is a gain in understanding.

Continued improvement and development of general science tests are anticipated, since the science testing board cited on the title page of this booklet has the continuing function of preparing and evaluating the *Harbrace Teaching Tests*. Comments or suggestions based upon the use of these titles will be welcomed and referred to the testing board.

CHAPTER 1: Ways of the Scientist

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. Nothing is known to travel faster than
 - a. atoms
 - b. sound
 - c. light
 - d. stars1.....
2. The first scientist to show that substances gain weight when they burn was
 - a. Lavoisier
 - b. Bridgman
 - c. Michelson
 - d. Perkin2.....
3. A standard unit of weight in the metric system is the
 - a. centimeter
 - b. cubic centimeter
 - c. pint
 - d. gram3.....
4. In science, the conclusions from one experiment usually
 - a. lead to other experiments
 - b. are unquestioned
 - c. end research on that topic
 - d. are final4.....
5. A scientist's first step in starting his work is to
 - a. go to the laboratory
 - b. state his problem clearly
 - c. build a theory
 - d. set up good controls5.....
6. Scientists make use of each of the following except
 - a. common sense
 - b. trial and error
 - c. "chance discovery"
 - d. superstition6.....
7. Scientists are best recognized by the
 - a. purpose they work for
 - b. place in which they work
 - c. ways in which they think and work
 - d. type of entertainment they enjoy7.....
8. Among the following, the one that is made up of the others is the
 - a. atom
 - b. electron
 - c. neutron
 - d. proton8.....
9. That a germ must come from another germ like it, is safely predicted on the basis of
 - a. future research
 - b. past research
 - c. guesswork
 - d. a working hypothesis9.....
10. The light-year is a measure of
 - a. time
 - b. energy
 - c. speed
 - d. distance10.....
11. Science is not defined as a body of
 - a. inventions
 - b. methods
 - c. opinion
 - d. tested information11.....
12. When a scientist is faced with a problem, he proposes several possible answers or
 - a. theories
 - b. hypotheses
 - c. conclusions
 - d. facts12.....

13. In determining the accuracy of a measurement, it is least important to know the
 a. person who made the measurement c. kind of instrument used
 b. number of measurements made d. accuracy of the instrument used 13...
14. Among the following, the last step of a scientist before publishing the results of his work is usually to
 a. change his original problem c. repeat his experiments and observations
 b. read all the known facts d. form a completely new hypothesis 14...
15. A research scientist is least interested in
 a. searching for facts c. forming working hypotheses
 b. forming theories d. applying facts 15...
16. Quantities such as the speed of light and pi (π)
 a. differ in America and Europe c. vary in different problems
 b. change slowly d. are constants 16...

Study carefully the following information; then complete statements 17 to 20.

A scientist performed an experiment to learn whether flies come from decaying meat. He set up the three jars diagramed below.



Jar open

A



Jar covered with
cheesecloth

B



Jar covered with
parchment

C

17. The scientist who originally did this experiment was
 a. Conant c. Fleming
 b. Redi d. Woodward 17...
18. Maggots of flies appeared in
 a. jar A only c. jars B and C
 b. jars A and B d. jar C only 18...
19. The jars that served as controls in this experiment are labeled
 a. A, B, and C c. A and C
 b. A and B d. B and C 19...
20. From this experiment the scientist concluded that
 a. flies dislike the odor of meat c. maggots come from flies' eggs
 b. the odor of meat goes through parchment d. maggots come from decaying meat 20...

CHAPTER 2: Ways of Learning

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. The cerebrum is the center for
 - a. breathing
 - b. thinking
 - c. knee reflexes
 - d. heartbeat1.....
2. Many of the responses with which you are born are
 - a. learned acts
 - b. habits
 - c. reflexes
 - d. conditioned reflexes2.....
3. The last step in forming the habit of touch-typewriting is
 - a. getting satisfaction from it
 - b. planning to do it
 - c. practicing it
 - d. wanting to do it3.....
4. When you sneeze because pepper reached your nose, the pepper is
 - a. an impulse
 - b. a reflex
 - c. a stimulus
 - d. a response4.....
5. Among the following, the term that includes all the others is
 - a. ears
 - b. eyes
 - c. organs of pressure
 - d. sense organs5.....
6. The part of the brain that acts as a center for making your muscles work together while you are walking is the
 - a. medulla
 - b. cerebrum
 - c. cerebellum
 - d. spinal cord6.....
7. Of the following, the special trait least important in helping man do things no other animal can do is his
 - a. ability to think
 - b. eyesight
 - c. flexible thumb
 - d. power of speech7.....

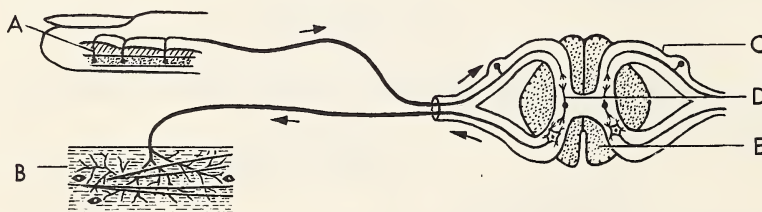
In the space after each of statements 8 to 10, write the letter

- a. if the statement describes a habit
 - b. if the statement describes a conditioned reflex
 - c. if the statement describes an inborn reflex
 - d. if the statement describes an act that requires thought
8. A boy writes a theme for English class. 8.....
9. Your saliva flows when your friend describes a delicious chocolate cake. 9.....
10. Tom wakes up at the same hour each morning. 10.....

Select the term that best completes each statement.

11. Pavlov showed that if a bell is rung each time a dog is fed, after a few weeks the dog will
 - a. salivate only when food is given
 - b. salivate when the bell is rung
 - c. be upset by the bell
 - d. not eat anything
 11....
12. Of the following acts, the one that is not a reflex is
 - a. walking when you were a small child
 - b. changing the size of the pupil of your eye
 - c. moving your ribs as you breathe
 - d. blinking when something comes near your eyes
 12....
13. The first step in learning and studying by yourself is
 - a. making your plans
 - b. getting the necessary materials
 - c. looking to your surroundings
 - d. defining your task
 13....
14. Among the following, the structure that is made up of all the others is the
 - a. cell body
 - b. long fiber
 - c. nerve cell
 - d. short fibers
 14....
15. The best way to break a bad habit is to
 - a. have someone watch you practice the bad habit
 - b. substitute a "good" habit for the "bad" habit
 - c. set a deadline for breaking the habit
 - d. tell yourself not to practice the habit
 15....
16. Reflexes and habits are alike in that both are
 - a. automatic
 - b. inborn
 - c. learned automatic acts
 - d. unlearned automatic acts
 16....

Study carefully the following diagram of the reflex pathway involved in pulling your finger away from a hot stove; then complete statements 17 to 20.

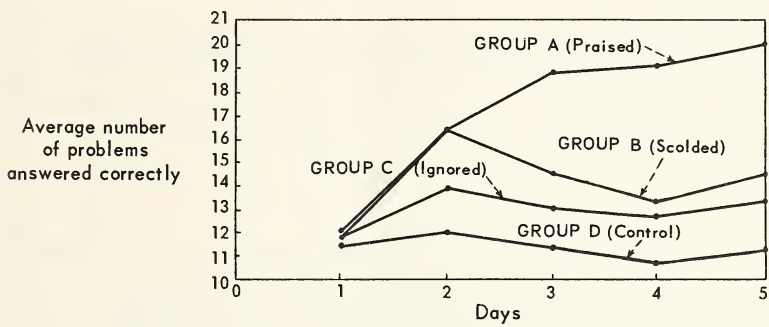


17. The structure labeled E is the
 - a. backbone
 - b. brain
 - c. spinal cord
 - d. connecting nerve cell
 17....
18. In the diagram above, the muscle is labeled
 - a. A
 - b. B
 - c. C
 - d. D
 18....
19. The nerves shown send to each other
 - a. impulses
 - b. reactions
 - c. responses
 - d. stimuli
 19....
20. The act of saying "ouch" after you pull your fingers away is evidence that an impulse has reached your
 - a. cerebellum
 - b. spinal cord
 - c. medulla
 - d. cerebrum
 20....

TEST OF INTERPRETATION 1 (Unit 1)

A. Study carefully the following information; then complete statements 1 to 5.

Four groups of students were each given the same thirty arithmetic problems to solve. On each of the next four days they were given another set to solve. Groups A, B, and C worked in the same classroom; group D worked in another room. Regardless of how many problems each group answered correctly, group A was praised, group B was scolded, and group C was ignored (left alone). The students in group D (the control group) simply took their daily test and handed in their papers. The graph below shows the results of the experiment.



(After Hurlock, E. B., "The Evaluation of Certain Incentives Used in School Work," *Journal of Ed. Psych.*, 1925, Vol. 16, p. 149.)

1. The highest average number of problems answered by any group was about

a. 5

b. 12

c. 20

d. 30

1.....
2. The group that answered correctly the smallest average number of problems was group

a. A

b. B

c. C

d. D

2.....
3. The only group whose average number of problems answered correctly did not decrease on any day during the experiment was group

a. A

b. B

c. C

d. D

3.....
4. The greatest increase in the average number of problems answered correctly by group B (scolded) was made on day

a. 5

b. 4

c. 3

d. 2

4.....
5. The results of this experiment indicate that

a. all of the groups gained from five days of practice

b. it is better to be scolded than ignored

c. group D, the control group, was unnecessary

d. the first-day scores were of no value

5.....

B. In each numbered space at the right of statements 6 to 10, place the letter of the term below that is related to the scientific activity described.

- a. theory
- b. fact
- c. hypothesis
- d. prediction based on experiment

- | | |
|--|--------|
| 6. On the basis of Pasteur's discovery that germs (or similar organisms) cause disease, scientists correctly foretold that polio is caused by an organism. | 6.... |
| 7. Redi guessed that maggots in meat come not from the meat itself but from eggs deposited on the meat by flies. | 7.... |
| 8. The doctor found that John's temperature was 99.4° F. | 8.... |
| 9. Newton's law of gravity explains the fall of an apple from a tree and the circling of the earth by the moon. | 9.... |
| 10. As the result of much scientific work and observation, scientists do not expect to find water on the moon. | 10.... |

C. In the numbered space at the right of each pair of terms in statements 11 to 15, write the letter

- a. if the term in Column B is included in or is part of the term in Column A
- b. if the term in Column A is included in or is part of the term in Column B
- c. if the term in neither column is included in or is part of the term in the other column
- d. if the terms in Column A and Column B refer to the same thing

<u>Column A</u>	<u>Column B</u>	
11. cerebrum	11. cerebellum	11....
12. reflex	12. inborn automatic act	12....
13. trial and error	13. scientific methods	13....
14. stimulus	14. response	14....
15. atom	15. electron	15....

UNIT 1 TEST OF INTERPRETATION, continued]

1. Study carefully the following paragraph; then complete statements 16 to 20 by following the instructions below.

In 1766, Cavendish studied the gas that is given off when a piece of zinc or iron is placed in acid. He collected the gas, and because it burned he called it "inflammable air." Cavendish believed he had produced phlogiston. However, it was his discovery of this gas (later known as hydrogen) and Priestley's discovery of oxygen, that led to the overthrow of the phlogiston theory and to Lavoisier's correct explanation of burning.

2. In the numbered space at the right of each statement write the letter

- a. if the statement is true on the basis of information in the paragraph
- b. if the statement is true but not on the basis of information in the paragraph
- c. if the statement is false on the basis of information in the paragraph
- d. if the statement is false but not on the basis of information in the paragraph

- | | |
|---|---------|
| 6. When zinc is placed in acid, hydrogen is given off. | 16..... |
| 7. The gas Cavendish produced was named "inflammable air" by Priestley. | 17..... |
| 8. Lavoisier believed that the gas oxygen was actually phlogiston. | 18..... |
| 9. Cavendish believed in the phlogiston theory. | 19..... |
| 10. When a substance burns it combines with oxygen. | 20..... |



CHAPTER 3: Your Cells and Their Needs

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. The living material of which all cells are made is

a. metabolism	c. protoplasm	
b. glucose	d. cytoplasm	1.....

2. A group of similar cells that work together doing one kind of work is

a. an organ	c. an organ system	
b. an organism	d. a tissue	2.....

3. The amount of heat energy in foods is measured in

a. calories	c. grams	
b. degrees	d. ounces	3.....

4. The vitamin that is needed to prevent pellagra is

a. vitamin K	c. thiamine	
b. riboflavin	d. niacin	4.....

5. For lunch a boy had spaghetti, rolls and butter, and a bottle of soda pop; his meal would have been better balanced if he had also had some

a. cake	c. potatoes	
b. salad	d. ice cream	5.....

6. The nutrient that the body uses mainly for growth and repair is

a. proteins	c. starches	
b. fats	d. sugars	6.....

7. Tomatoes and citrus fruits, such as oranges, are good sources of vitamin

a. A	c. C	
b. B ₁	d. D	7.....

8. Of the following, all are required for building strong bones except

a. calcium	c. phosphorus	
b. vitamin B	d. vitamin D	8.....

9. The best source of vitamins for young people is

a. "The Basic Seven"	c. vitamin pills	
b. milk	d. whole-grain cereals	9.....

10. The mineral needed to form hemoglobin for red blood cells is

a. ascorbic acid	c. salt	
b. iodine	d. iron	10.....

11. You use fewer calories while walking than while

a. reading	c. swimming	
b. sleeping	d. writing	11.....

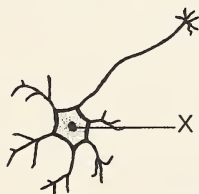
12. Fish and eggs can take the place of meat in the diet because they contain large amounts of

a. vitamins A and D	c. carbohydrates	
b. fats	d. proteins	12.....

13. The deficiency disease that may result from a lack of vitamin A is
 a. anemia c. beriberi
 b. night blindness d. scurvy 13..
14. A student who weighs 110 pounds should eat daily about
 a. 1,100 calories c. 2,750 calories
 b. 2,150 calories d. 3,800 calories 14..
15. When you exhale, your body gives off
 a. both carbon dioxide and water c. less carbon dioxide than you inhale
 b. carbon dioxide but no water d. limewater and carbon dioxide 15..
16. Proteins, unlike carbohydrates, contain the element
 a. nitrogen c. carbon
 b. hydrogen d. oxygen 16..
17. In the body, heat energy is produced by the
 a. replacing of lost cells c. slow oxidation of food
 b. inhaling of oxygen d. digestion of glucose 17..

Study carefully the information below; then complete statements 18 to 20.

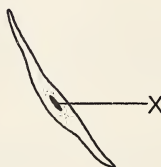
A student observed four different slides under a microscope. He drew the following diagrams of what he saw on the various slides.



A



B



C



D

18. The student scraped the inside of his cheek to get cells of the type in diagram
 a. A c. C
 b. B d. D 18..
19. The cell part labeled X in each of the diagrams is the
 a. nucleus c. cytoplasm
 b. cell wall d. cell membrane 19..
20. Cells of the type in diagram C
 a. carry impulses c. carry oxygen in the blood
 b. can shorten and lengthen d. line the intestine 20..

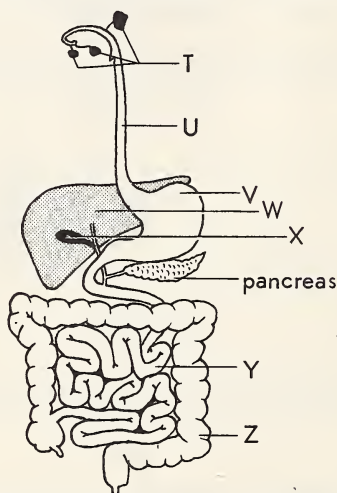
CHAPTER 4: Your Blood Will Tell

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. Blood vessels that carry blood away from the heart are
 a. veins
 b. arteries
 c. lacteals
 d. capillaries
 1.....
2. Bacteria that enter the blood stream are attacked by
 a. hemoglobin
 b. plasma
 c. white blood cells
 d. red blood cells
 2.....
3. Your lungs are made up of millions of thin-walled
 a. air sacs
 b. bronchial tubes
 c. diaphragms
 d. windpipes
 3.....
4. The process of breaking down complex foods into simpler substances is
 a. absorption
 b. oxidation
 c. circulation
 d. digestion
 4.....
5. If you cut yourself and your blood rushes out in spurts, you have cut
 a. a capillary
 b. a lacteal
 c. a vein
 d. an artery
 5.....
6. When blood is rich in oxygen, the blood
 a. is bright red in color
 b. is blue in color
 c. turns Benedict's solution colorless
 d. turns blue when tested with iodine
 6.....
7. Water and cell wastes are removed from the blood by each of the following
except the
 a. lungs
 b. kidneys
 c. bladder
 d. skin
 7.....
8. The tiny, tubelike structures lining the inside of the small intestine are
 a. villi
 b. ureters
 c. valves
 d. aortas
 8.....
9. Among the following, the term that does not belong with the others is
 a. gastric juice
 b. hydrochloric acid
 c. pepsin
 d. appendix
 9.....
10. In the body nutrients are broken down into simpler substances by
 a. hormones
 b. enzymes
 c. urea
 d. lymph
 10.....
11. Blood takes in oxygen in the
 a. lungs
 b. nose
 c. heart
 d. sweat glands
 11.....
12. A part of plasma that helps blood to clot is
 a. antibodies
 b. serum albumin
 c. fibrinogen
 d. gamma globulin
 12.....

13. In the body dissolved nutrients are carried by the
 a. enzymes
 b. plasma
 c. hormones
 d. red corpuscles 13...
14. Valves prevent the backward flow of blood in
 a. arteries
 b. capillaries
 c. pressure points
 d. veins 14...
15. When you inhale, your
 a. chest muscles "push" air out of your lungs
 b. diaphragm "pulls" air into your lungs
 c. lungs "pull" air into your chest cavity
 d. ribs "push" air out of your chest cavity 15...
16. The "middleman" between the cells and capillaries is
 a. lymph
 b. fibrin
 c. nitrogenous wastes
 d. blood 16...
17. The heart chamber that receives blood from the lungs is the
 a. left ventricle
 b. left auricle
 c. right ventricle
 d. right auricle 17...

Study carefully the following diagram; then complete statements 18 to 20.



18. The organ that produces bile and stores sugar is labeled
 a. U
 b. V
 c. W
 d. X 18...
19. The glands labeled T produce a digestive juice that changes
 a. starch into sugars
 b. sugars into starch
 c. amino acids into proteins
 d. proteins into amino acids 19...
20. The digestive juices produced by the pancreas
 a. digest only fats
 b. digest only proteins
 c. act in the organ labeled Z
 d. act in the organ labeled Y 20...

CHAPTER 5: Your Body Against Unseen Killers

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. Bacteria are microscopic

a. protozoa

b. plants

c. molds

d. animals

1.....
2. The greatest amount of time that people lose from both school and work is due to

a. pneumonia

b. cancer

c. common colds

d. tuberculosis

2.....
3. A rod-shaped bacterium is a

a. bacillus

b. coccus

c. spirillum

d. virus

3.....
4. Today the average life span in the United States is about

a. 50 years

b. 60 years

c. 70 years

d. 80 years

4.....
5. Of the following, each is a body defense against bacteria except

a. mucous membranes

b. stomach acid

c. skin

d. red blood cells

5.....
6. The first scientist who said that diseases are caused by germs was

a. Fleming

b. Koch

c. Pasteur

d. Salk

6.....
7. Among the following, the term that includes all the others is

a. Aureomycin

b. antibiotic

c. penicillin

d. streptomycin

7.....
8. Large spots of bacteria growing on the gelatin in a Petri dish are

a. molds

b. antitoxins

c. antibodies

d. colonies

8.....
9. Among the following, a disease that is caused by germs is

a. high blood pressure

b. tuberculosis

c. hardening of the arteries

d. diabetes

9.....
10. An unfavorable condition under which bacteria may form spores is

a. lack of moisture

b. no sunlight

c. too much food

d. warmth

10.....
11. You are in danger of getting lockjaw (tetanus) if you have

a. breathed impure air

b. stepped on a nail

c. drunk impure water

d. contacted a carrier

11.....
12. All bacteria

a. are micro-organisms

b. are harmful

c. are germs

d. cause disease

12.....

13. Chemical substances that the body makes against germs are
 - a. antibiotics
 - b. toxins
 - c. hormones
 - d. antibodies13.....
14. Scientists now know that decay bacteria
 - a. are seen only with electron microscopes
 - b. cause high blood pressure
 - c. break down dead plants and animals
 - d. produce different types of antibiotics14.....
15. A means of discovering tuberculosis but not of treating the disease is
 - a. isoniazids
 - b. X rays
 - c. streptomycin
 - d. complete rest15.....
16. Among the following, the term that does not belong with the others is
 - a. sterilization
 - b. inoculation
 - c. injection
 - d. vaccination16.....
17. Two diseases from which the death rate in the United States is increasing are
 - a. polio and influenza
 - b. pneumonia and cancer
 - c. cancer and heart disease
 - d. tuberculosis and polio17.....
18. A person ill with diphtheria is usually treated with
 - a. a toxin
 - b. an antitoxin
 - c. insulin
 - d. natural immunity18.....
19. The disease malaria is not
 - a. spread by a virus
 - b. carried by the anopheles mosquito
 - c. caused by a protozoon
 - d. treated with atabrine or quinine19.....
20. A bacterium is related to diphtheria as a fungus is related to
 - a. typhus
 - b. smallpox
 - c. typhoid
 - d. athlete's foot20.....

CHAPTER 6: Your Community Helps

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

- 1. Most children who have started school have been vaccinated against
 - a. chicken pox
 - b. scarlet fever
 - c. smallpox
 - d. malaria1.....
- 2. The poisonous gas used in small quantities to purify city water supplies is
 - a. alum
 - b. limewater
 - c. fluorine
 - d. chlorine2.....
- 3. When milk is pasteurized to kill dangerous germs, it is
 - a. heated to about 145°F
 - b. boiled for twenty minutes
 - c. frozen very rapidly
 - d. cooled slowly3.....
- 4. A house may be quarantined if someone in it has a disease that is
 - a. difficult to treat
 - b. easy to control
 - c. very rare
 - d. spread rapidly4.....
- 5. A system of pipes that carry water over great distances is
 - a. a watershed
 - b. an aqueduct
 - c. a dam
 - d. a reservoir5.....
- 6. On a farm, septic tanks and garbage heaps should be placed on land
 - a. below drinking-water sources
 - b. above drinking-water sources
 - c. level with drinking-water sources
 - d. 10 feet from drinking-water sources6.....
- 7. The Schick test helps to control
 - a. scarlet fever
 - b. polio
 - c. diphtheria
 - d. malaria7.....
- 8. The frozen-food industry is based on the fact that bacteria need
 - a. moisture
 - b. warmth
 - c. food
 - d. air8.....
- 9. A method of restoring taste and air to large water supplies is
 - a. aeration
 - b. filtration
 - c. settling
 - d. sterilization9.....
- 10. Among the following, the term that does not belong with the others is
 - a. fleas
 - b. bubonic plague
 - c. rats
 - d. fungus10.....
- 11. An example of a communicable disease is
 - a. cancer
 - b. arthritis
 - c. measles
 - d. diabetes11.....
- 12. The top of the underground soil layer that is holding as much water as possible is
 - a. a spring
 - b. an artesian well
 - c. the watershed
 - d. the water table12.....

13. Vaccination against smallpox was developed by
 - a. Koch
 - b. Jenner
 - c. Pasteur
 - d. Lister13.....
14. Of the following, the one most likely to result in trichinosis is
 - a. drinking impure milk
 - b. drinking warm soda pop
 - c. eating undercooked pork
 - d. eating frozen foods14.....
15. Regular inspection of dairy cows by health officers helps to prevent the spread of typhoid and
 - a. tuberculosis
 - b. yellow fever
 - c. the common cold
 - d. tetanus15.....
16. The process of removing water from food to preserve the food is
 - a. dehydration
 - b. pickling
 - c. pasteurization
 - d. canning16.....
17. In most artesian wells the water
 - a. is rarely pure or safe to drink
 - b. is pumped from a low level
 - c. spurts out at ground level
 - d. is trapped in nonporous rock17.....

Read carefully the following paragraph; then complete statements 18 to 20.

Several boys went on a week-long camping trip. Among other foods, they took along cans of baked beans, fresh hamburger meat, potato chips, and pickles. They camped near a clear spring and had a good time until Tom became quite sick. His friends rushed him to the nearest doctor, who said that Tom had ptomaine poisoning.

18. Tom probably got ptomaine poisoning from eating partly decayed
 - a. baked beans
 - b. potato chips
 - c. pickles
 - d. hamburger meat18.....
19. The doctor said that although the spring water looked clear, it might be carrying the germs of
 - a. typhoid fever
 - b. smallpox
 - c. diphtheria
 - d. mumps19.....
20. The doctor warned the boys not to drink the spring water without
 - a. aerating it
 - b. boiling it
 - c. filtering it
 - d. saturating it20.....

UNIT 2: Lengthening Man's Life

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. Saliva changes starch to sugar in the

a. mouth

b. liver

c. stomach

d. small intestine

1.....
2. Scurvy may result from a lack of

a. vitamin A

b. iron

c. vitamin C

d. iodine

2.....
3. A disease involving a rapid and unusual growth of cells is

a. anemia

b. cancer

c. diabetes

d. hardening of the arteries

3.....
4. A method used to restore taste to water is

a. chlorination

b. aeration

c. sedimentation

d. filtration

4.....
5. Your body cells that work by getting shorter and then longer form

a. bone tissue

b. cartilage tissue

c. nerve tissue

d. muscle tissue

5.....
6. Aureomycin is an example of

a. an antibiotic

b. an enzyme

c. an antibody

d. a hormone

6.....
7. For growth, bacteria need each of the following conditions except

a. food

b. sunlight

c. moisture

d. warmth

7.....
8. Germs that enter the body may be destroyed by

a. platelets

b. toxins

c. white blood cells

d. red blood cells

8.....
9. Liquid wastes are removed from blood in the kidneys and

a. skin

b. lacteals

c. bladder

d. small intestine

9.....
10. One method of preventing the spread of measles is to

a. pasteurize all milk

b. quarantine the patient

c. give the Schick test

d. have an X-ray examination

10.....
11. The nutrient the body uses mainly for energy is

a. proteins

b. minerals

c. fats

d. carbohydrates

11.....

12. A disease we may get from eating uncooked pork is
 - a. high blood pressure
 - b. tetanus
 - c. trichinosis
 - d. yellow fever12.....
13. A person who can spread typhoid germs although he is not sick with the disease
 - a. was vaccinated
 - b. is a carrier
 - c. has acquired immunity
 - d. inherited the disease13.....
14. The small beadlike part near the center of a cell is the
 - a. nucleus
 - b. cytoplasm
 - c. protoplasm
 - d. cell membrane14.....
15. Sugars and starches are made up of
 - a. only carbon and hydrogen
 - b. only carbon and oxygen
 - c. only carbon, hydrogen, and oxygen
 - d. carbon, hydrogen, oxygen, and nitrogen15.....
16. A lack of thiamine (vitamin B₁) in the diet may result in
 - a. a communicable disease
 - b. soft bones
 - c. night blindness
 - d. beriberi16.....
17. Water spurts from an underground layer of porous rock in
 - a. an artesian well
 - b. an ordinary well
 - c. a dam
 - d. a spring17.....
18. An example of a disease caused by a virus is
 - a. ptomaine poisoning
 - b. polio
 - c. tuberculosis
 - d. typhoid18.....
19. Cocci bacteria are
 - a. rod-shaped
 - b. spiral-shaped
 - c. square
 - d. spherical19.....
20. A person ill with tetanus may be treated successfully with
 - a. a toxin
 - b. a vaccine
 - c. an antitoxin
 - d. insulin20.....
21. Malaria is caused by
 - a. anopheles mosquitoes
 - b. a bacterium
 - c. a fungus
 - d. a protozoon21.....
22. The fluid part of the circulating blood is
 - a. fibrin
 - b. gamma globulin
 - c. plasma
 - d. lymph22.....
23. An example of a body organ is
 - a. the heart
 - b. the digestive tube
 - c. fat
 - d. bile23.....
24. A scientist who prepared a highly effective polio vaccine is
 - a. Fleming
 - b. Banting
 - c. Salk
 - d. Pasteur24.....

[UNIT 2 TEST, continued]

25. Bacteria are larger than
 - a. red corpuscles
 - b. viruses
 - c. molds
 - d. protozoa25.....
26. An example of a deficiency disease is
 - a. bubonic plague
 - b. diphtheria
 - c. pellagra
 - d. tetanus26.....
27. Digested nutrients are absorbed through villi in the
 - a. large intestine
 - b. small intestine
 - c. liver
 - d. stomach27.....
28. The heart chamber that pumps blood to the lungs is the
 - a. left auricle
 - b. left ventricle
 - c. right auricle
 - d. right ventricle28.....
29. A large area from which rain water flows into creeks and rivers is
 - a. a watershed
 - b. a water table
 - c. a reservoir
 - d. an aqueduct29.....
30. Under unfavorable conditions some bacteria form
 - a. germs
 - b. colonies
 - c. spores
 - d. micro-organisms30.....
31. A digestive juice that helps in the digestion of all nutrients is produced by the
 - a. liver
 - b. pancreas
 - c. gall bladder
 - d. gullet31.....
32. The exchange of food and oxygen between the body cells and the blood takes place through
 - a. capillaries
 - b. arteries
 - c. aortas
 - d. veins32.....
33. Fruits and vegetables are important in the diet mainly as a source of
 - a. fats and calories
 - b. calories and starches
 - c. vitamins and proteins
 - d. minerals and vitamins33.....
34. Vaccination against smallpox causes your body to produce
 - a. antibiotics
 - b. antibodies
 - c. enzymes
 - d. hormones34.....
35. When you inhale, air passes from the bronchial tubes to the
 - a. voice box
 - b. diaphragm
 - c. air sacs
 - d. windpipe35.....
36. One result of slow oxidation in the body is the
 - a. production of oxygen
 - b. using up of water
 - c. digestion of food
 - d. formation of carbon dioxide36.....

Read carefully the following paragraph; then complete statements 37 to 40.

Several students performed an experiment to learn which part of the gastric juice is necessary for the complete digestion of proteins into soluble amino acids. They placed an equal number of small pieces of cooked egg white into each of five test tubes. They then added dry pepsin to test tube I, pepsin and water to test tube II, hydrochloric acid (which contains water) to test tube III, just water to test tube IV, and pepsin, water, and hydrochloric acid to test tube V. The students placed all the test tubes in a warm place and observed them after twenty-four hours. They saw no change in test tubes I, III, and IV; they noticed a small cloudy area around the almost undissolved egg white in test tube II; and they saw that in test tube V, the egg white had dissolved completely and the liquid had turned cloudy.

37. The students were performing an experiment to study protein digestion in the
a. pancreas c. stomach
b. small intestine d. liver 37.....
38. Among the test tubes that contained enzymes were numbers
a. I and II c. III and IV
b. II and III d. III and V 38.....
39. The students learned that the complete digestion of proteins requires
a. only water c. only pepsin and water
b. only hydrochloric acid d. pepsin, hydrochloric acid, and water 39.....
40. Soluble amino acids were probably present in test tubes
a. I, II, and IV c. II, III, and IV
b. II and V d. I, III, IV, and V 40.....

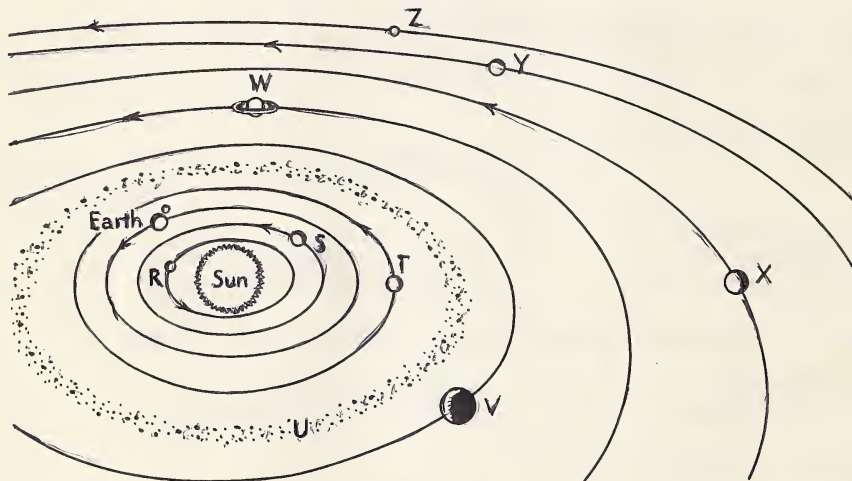
CHAPTER 7: Our Sun and Its Planets

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. The star that is almost over the earth's North Pole is
 a. Ganymede
 b. Uranus
 c. Polaris
 d. Arcturus
 1.....
2. A heavenly body with a tail of glowing gas is a
 a. comet
 b. meteorite
 c. planet
 d. satellite
 2.....
3. The first of the following astronomers to believe that the sun is the center of a system of planets was
 a. Ptolemy
 b. Galileo
 c. Jeans
 d. Copernicus
 3.....
4. Of the following, each is a constellation except
 a. Ahnighito
 b. the Big Dipper
 c. Pegasus
 d. Cassiopeia
 4.....
5. The earth turns on its axis once every
 a. hour
 b. 24 hours
 c. month
 d. $365\frac{1}{2}$ days
 5.....
6. Washington, D.C., is located
 a. on the International Date Line
 b. on the zero-degree meridian
 c. near a line of east longitude
 d. near a line of west longitude
 6.....
7. When deep-sea fish are hauled up quickly from the ocean, they swell because of a sudden
 a. increase in pressure
 b. increase in temperature
 c. decrease in pressure
 d. decrease in temperature
 7.....
8. A "shooting star" is actually
 a. a meteor
 b. a spiral nebula
 c. a comet
 d. an asteroid
 8.....
9. Our solar system is part of the Milky Way
 a. constellation
 b. galaxy
 c. planetarium
 d. universe
 9.....
10. The changing white areas on Mars seem to indicate the
 a. proper pressure for life
 b. proper temperature for life
 c. presence of oxygen
 d. presence of water
 10.....
11. During three hours the earth turns on its axis
 a. 3 degrees
 b. 30 degrees
 c. 45 degrees
 d. 90 degrees
 11.....
12. Astronomers have learned that our sun is
 a. a spotless, fiery ball
 b. a medium-sized star
 c. a very heavy solid
 d. cooler inside than outside
 12.....

13. The universe consists mainly of
 a. empty space
 b. other solar systems
 c. swarms of stars
 d. very hot gases
 13.....
14. When it is noon in California, in New York it is
 a. 9 A.M.
 b. 2 P.M.
 c. 3 P.M.
 d. midnight
 14.....
15. Sunrise and sunset result from the
 a. gaseous nature of the sun
 b. revolution of the sun
 c. revolution of the earth
 d. rotation of the earth
 15.....
16. Each planet completes its orbit around the sun in
 a. 88 days
 b. $365\frac{1}{2}$ days
 c. one rotation
 d. one revolution
 16.....
17. Seasonal changes in the lengths of days and nights result in part from the
 a. great heat of the sun
 b. tilt of the earth's axis
 c. rotation of the earth
 d. direct rays of the sun
 17.....

Study carefully the diagram below; then complete statements 18 to 20.



18. In this diagram the planet Saturn is labeled
 a. W
 b. S
 c. V
 d. X
 18.....
19. The heavenly bodies in the group labeled U in the diagram are
 a. meteorites
 b. comets
 c. nebulae
 d. planetoids
 19.....
20. In this diagram a planet that circles the sun in less time than the earth does is labeled
 a. Z
 b. T
 c. R
 d. V
 20.....

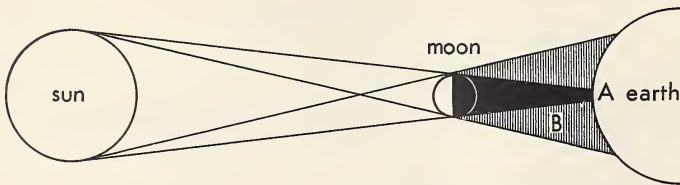
CHAPTER 8: Our Planet Home—and Its Moon

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. The force by which the earth attracts objects is
 - a. resistance
 - b. gravity
 - c. pressure
 - d. velocity1.....
2. A new moon occurs once every
 - a. night
 - b. week
 - c. $29\frac{1}{2}$ days
 - d. year2.....
3. Where faults occur, we often have
 - a. earthquakes
 - b. seismographs
 - c. volcanoes
 - d. dust storms3.....
4. The height of Mt. Everest is not as great as the
 - a. height of Lassen Peak in California
 - b. height of Parícutin, Mexico
 - c. depth of the deepest oil well
 - d. depth of the Mindanao Deep4.....
5. About seventy per cent of the earth's surface is
 - a. in the "Volcano Belt"
 - b. in the "Earthquake Belt"
 - c. made of dry land
 - d. covered by water5.....
6. A lunar eclipse can occur only during the time of a
 - a. full moon
 - b. new moon
 - c. first-quarter moon
 - d. last-quarter moon6.....
7. The greatest effect on tides is produced by the
 - a. pull of the earth
 - b. pull of the sun
 - c. pull of the moon
 - d. change of seasons7.....
8. Space travelers who explore the moon will
 - a. find no water to drink
 - b. hear many loud noises
 - c. feel great air pressure
 - d. feel a small temperature range8.....
9. The beautiful glow or halo that appears during a total solar eclipse is
 - a. the "dark of the moon"
 - b. a prominence
 - c. Bailey's Beads
 - d. the corona9.....
10. Among the following, the term that is not related to the others is
 - a. earthquakes
 - b. neap tides
 - c. shock waves
 - d. tidal waves10.....
11. We see only one side of the moon because while revolving once around the earth the moon rotates
 - a. one time
 - b. $29\frac{1}{2}$ times
 - c. 41 per cent
 - d. 59 per cent11.....
12. The Law of Universal Gravitation was developed by
 - a. Hillary
 - b. Houot
 - c. Newton
 - d. Tenzing12.....

13. The time between high and low tides is about
 a. 50 minutes
 b. 6 hours
 c. 12 hours
 d. 24 hours
 13.....
14. Mountains can be built by the action of
 a. weathering
 b. erosion
 c. deltas
 d. volcanoes
 14.....
15. To a space traveler on the moon, the sky will seem black because
 a. the rills and craters are very deep
 b. there is no dust to scatter light
 c. mountains cut off the sun's rays
 d. dust in the air absorbs all light rays
 15.....
16. If you weigh 100 pounds in New York, you will weigh about
 a. 17 pounds on the moon
 b. 98 pounds at the North Pole
 c. 103 pounds at the equator
 d. 500 pounds on Jupiter
 16.....

Study carefully the diagram below; then complete statements 17 to 20.



17. A person standing in the region of the earth labeled A in the diagram would see
 a. an annular eclipse
 b. a total solar eclipse
 c. a partial solar eclipse
 d. a lunar eclipse
 17.....
18. An airplane flying in the region labeled B in the diagram would be in the
 a. earthshine
 b. prominence
 c. penumbra
 d. umbra
 18.....
19. The phase of the moon shown in the diagram is the
 a. new-moon phase
 b. full-moon phase
 c. last-quarter phase
 d. first-quarter phase
 19.....
20. During the eclipse shown in the diagram, all parts of the earth have
 a. low tide
 b. neap tide
 c. normal tide
 d. spring tide
 20.....

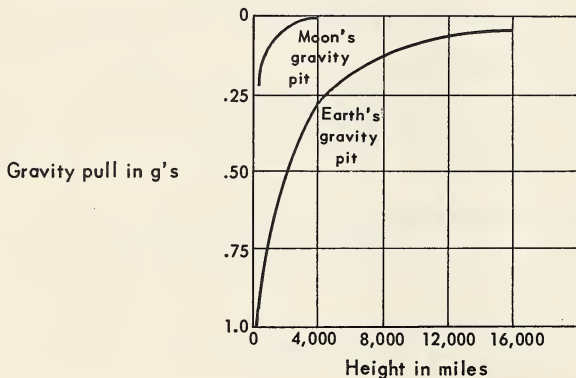
CHAPTER 9: Space, Our New Frontier

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. Rockets, unlike jet engines, must carry their own supply of
 - a. hydrogen
 - b. fuel
 - c. oxygen
 - d. nitrogen1.....
2. The feeling of falling to which travelers in space must adjust is
 - a. acceleration
 - b. motion
 - c. inertia
 - d. weightlessness2.....
3. The first United States satellites were sent into orbit by
 - a. liquid-fuel rockets
 - b. nuclear-powered rockets
 - c. single-stage rockets
 - d. V-2 rockets3.....
4. The first United States man-made planet that passed the moon and went into orbit around the sun was
 - a. Mechta I
 - b. Explorer I
 - c. Sputnik I
 - d. Pioneer IV4.....
5. Man-made satellites can be seen only
 - a. on moonless nights
 - b. during twilight
 - c. around midnight
 - d. at high noon5.....
6. Newton's third law states that for every action there is
 - a. an equal reaction in the opposite direction
 - b. an equal reaction in the same direction
 - c. a greater reaction in the same direction
 - d. a smaller reaction in the opposite direction6.....
7. The speed at which a rocket must travel to escape the earth's gravity is about
 - a. 10,000 miles per hour
 - b. 18,000 miles per hour
 - c. 25,000 miles per hour
 - d. 186,000 miles per hour7.....
8. Good fuels for sending satellites into orbit give
 - a. great inertia
 - b. great thrust
 - c. low temperatures
 - d. low velocity8.....
9. The largest part of a satellite-carrying three-stage rocket is the
 - a. first stage
 - b. second stage
 - c. third stage
 - d. pay load9.....
10. The point at which any satellite in orbit is closest to the earth is
 - a. $28\frac{1}{2}^{\circ}$ north
 - b. 50° north
 - c. its apogee
 - d. its perigee10.....
11. Information gained from successful rockets shows that
 - a. it is not possible to track satellites with radios and cameras
 - b. the temperature in satellites is outside the "living range"
 - c. cosmic rays in space are more intense than we had thought
 - d. at 135 miles up the air is much lighter than we had expected11.....

12. If a body starting from rest has a final velocity of 192 feet per second, its average velocity is
 a. 16 feet per second
 b. 32 feet per second
 c. 64 feet per second
 d. 96 feet per second
 12.....
13. The tendency of a body in motion to keep traveling in a straight line or of a body at rest to keep standing still is
 a. acceleration
 b. inertia
 c. reaction
 d. action
 13.....
14. A rocket must be slowed down to keep it from burning up on
 a. releasing its nose cone
 b. going into orbit
 c. re-entry
 d. taking off
 14.....
15. Of the following, each is true of a possible space station except that
 a. it could escape the earth's gravity
 b. it could be used to study weather patterns
 c. it could be a base for spaceships
 d. algae could be grown there for food and oxygen
 15.....
16. To remain in orbit, a satellite must fall toward the earth and
 a. speed sideways
 b. speed at 2 miles per second
 c. escape the earth's gravity
 d. escape the earth's inertia
 16.....
17. If a spaceman were not wearing a special suit in space, his blood would boil as a result of the
 a. low acceleration
 b. high acceleration
 c. low air pressure
 d. high air pressure
 17.....

Study carefully the graph below; then complete statements 18 to 20.



18. The graph above shows the
 a. distance a satellite falls
 b. final velocity of a falling body
 c. average velocity of a falling body
 d. decrease of gravity with distance
 18.....
19. At 4,000 miles above the earth's surface the pull of the earth's gravity is about
 a. .25 g's
 b. .50 g's
 c. .75 g's
 d. 1.0 g's
 19.....
20. At the surface of the moon the pull of the moon's gravity is almost
 a. 0 g's
 b. .25 g's
 c. 1.0 g's
 d. 50 g's
 20.....

UNIT 3: Exploring the Earth and Space

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. On leaving the earth, a rocket must overcome the force of
 - a. acceleration
 - b. air pressure
 - c. gravity
 - d. perigee1.....
2. One of the constellations in our night sky is
 - a. Polaris
 - b. Cassiopeia
 - c. Saturn
 - d. Mechta2.....
3. In our solar system the planet farthest from the sun is
 - a. Pluto
 - b. Uranus
 - c. Jupiter
 - d. Neptune3.....
4. The flame-like tongues of light that may be seen during a total solar eclipse are
 - a. Bailey's Beads
 - b. prominences
 - c. sunspots
 - d. the corona4.....
5. The hot gases escaping from a rocket
 - a. overcome the thrust of the rocket
 - b. pull the rocket in the same direction
 - c. move the rocket sideways
 - d. push the rocket in the opposite direction5.....
6. In one hour the earth rotates
 - a. 15°
 - b. 25°
 - c. 60°
 - d. 360°6.....
7. A boy who weighs 120 pounds in Washington, D. C., would weigh
 - a. the same at the equator
 - b. less at the North Pole
 - c. more on Jupiter
 - d. more on the moon7.....
8. During a solar eclipse the moon is in the
 - a. first-quarter phase
 - b. last-quarter phase
 - c. full-moon phase
 - d. new-moon phase8.....
9. Members of Operation Moonwatch usually sight satellites
 - a. on a sunny day
 - b. on a rainy day
 - c. just after sunset
 - d. around midnight9.....
10. Day and night result from the
 - a. revolution of the earth
 - b. rotation of the earth
 - c. tilt of the earth's axis
 - d. time zones on the earth10.....
11. There are about fifteen days between
 - a. a new moon and a full moon
 - b. a new moon and the first-quarter phase
 - c. two new moons
 - d. a new moon and the last-quarter phase11.....

12. When it is 2 P.M. in the Pacific Time Zone, in the Central Time Zone it is
 - a. 2 A.M.
 - b. 10 A.M.
 - c. 12 noon
 - d. 4 P.M.12.....
13. To travel in outer space, a liquid-fuel rocket must carry its own supply of
 - a. nitrogen
 - b. hydrogen
 - c. oxygen
 - d. carbon dioxide13.....
14. The darkest part of the moon's shadow during a solar eclipse is the
 - a. umbra
 - b. penumbra
 - c. earthshine
 - d. "dark of the moon"14.....
15. The sun seems to rise in the east because the
 - a. earth rotates from east to west
 - b. earth rotates from west to east
 - c. earth revolves from east to west
 - d. earth revolves from west to east15.....
16. The greatest effect on tides is produced by the pull of gravity of the
 - a. ocean water
 - b. sun
 - c. earth
 - d. moon16.....
17. If the car in which you are riding stops suddenly, you may lunge forward because of
 - a. velocity
 - b. thrust
 - c. inertia
 - d. acceleration17.....
18. A heavenly body that does not move in a fixed orbit is a
 - a. meteor
 - b. comet
 - c. planet
 - d. satellite18.....
19. A seismograph is used to record
 - a. earthquakes
 - b. tides
 - c. air pressure
 - d. rocket paths19.....
20. While the moon rotates once
 - a. it accelerates around the earth
 - b. it revolves once around the earth
 - c. its gravity increases
 - d. its velocity decreases20.....
21. The Milky Way is a
 - a. solar system
 - b. nebula
 - c. universe
 - d. galaxy21.....
22. From the successful firing of earth satellites by three-stage rockets during the IGY, we learned that the third stage of the rocket
 - a. adds the needed speed for orbiting
 - b. sends the nose cone back to earth
 - c. completely overcomes the pull of gravity
 - d. burns the fuel for all three stages22.....
23. Pieces of stone or metal that reach the earth from outer space are
 - a. asteroids
 - b. comets
 - c. meteors
 - d. meteorites23.....
24. The building-up action of rivers
 - a. forms craters
 - b. forms deltas
 - c. is erosion
 - d. is weathering24.....

[UNIT 3 TEST, continued]

25. To keep from being pulled back to earth, a satellite must have
 - a. a greater gravity than the earth
 - b. a perfectly circular orbit
 - c. a sideways speed around the earth
 - d. an unequal action and reaction

25.....
26. Workmen in a space station will probably have problems caused by each of the following except
 - a. cosmic rays
 - b. lack of sunlight
 - c. low air pressure
 - d. weightlessness

26.....
27. The tiny bodies that orbit around the sun between the paths of Mars and Jupiter are
 - a. planetoids
 - b. meteors
 - c. comets
 - d. stars

27.....
28. During each day there are usually
 - a. one high and one low tide
 - b. one neap and one spring tide
 - c. two high and two low tides
 - d. two neap and two spring tides

28.....
29. The time required for the earth to make one revolution is
 - a. 24 hours
 - b. one week
 - c. one month
 - d. $365\frac{1}{4}$ days

29.....
30. The underground vibrations set up by an earthquake are
 - a. faults
 - b. shock waves
 - c. tidal waves
 - d. volcanoes

30.....
31. By watching the movements of sunspots, astronomers learned that the
 - a. earth rotates
 - b. solar system revolves
 - c. sun revolves
 - d. sun rotates

31.....
32. When the earth is between the moon and the sun, we may have
 - a. a partial solar eclipse
 - b. a total solar eclipse
 - c. a lunar eclipse
 - d. an annular eclipse

32.....
33. 6 P.M., Tuesday, June 6, becomes 6 P.M., Wednesday, June 7, when you cross
 - a. the Greenwich Meridian from east to west
 - b. the 180th meridian from east to west
 - c. the International Date Line from west to east
 - d. from the Northern to the Southern Hemisphere

33.....
34. If the average speed of a falling body is 80 feet per second, in 5 seconds it will fall
 - a. 16 feet
 - b. 80 feet
 - c. 200 feet
 - d. 400 feet

34.....
35. When and if a space traveler reaches the moon, he will probably
 - a. see the stars during the daytime
 - b. find the air is almost pure oxygen
 - c. have many hours of rain daily
 - d. have felt gradually increasing air pressure

35.....

Read carefully the following paragraph; then complete statements 36 to 40.

On January 31, 1958, Explorer I, weighing 30.8 pounds, went into orbit while traveling at about 18,000 miles per hour. Its orbit has a minimum altitude of 200 miles and a maximum altitude of 1,590 miles. On December 13, 1958 a 13-inch squirrel monkey was shot off in the nose cone of a Jupiter missile. For $2\frac{1}{2}$ minutes after take-off the monkey was successfully subjected to a force of 10 g's. On March 3, 1959, a 60-ton rocket was blasted off with a 13.4-pound pay load. This pay load, known as Pioneer IV, passed within 37,000 miles of the moon and later went into orbit around the sun.

- | | | |
|--|----------------------------------|--------|
| 36. The apogee of Explorer I is | | |
| a. 30.8 pounds | c. 1,590 miles | |
| b. 220 miles | d. 18,000 miles per hour | 36.... |
| 37. The present orbit of Pioneer IV is most similar to the orbit of | | |
| a. a planet | c. a comet | |
| b. a star | d. the moon | 37.... |
| 38. The weight of rocket required to place each pound of pay load of Pioneer IV in orbit was about | | |
| a. 13.4 pounds | c. 4.5 tons | |
| b. 804 pounds | d. 60 tons | 38.... |
| 39. The velocity of escape of Pioneer IV must have been at least | | |
| a. 18,000 miles per hour | c. 37,000 miles per hour | |
| b. 25,000 miles per hour | d. 93,000,000 miles per hour | 39.... |
| 40. While the squirrel monkey was being shot away from the earth, he felt at most | | |
| a. one tenth gram of gravity pull | c. one tenth the pull of gravity | |
| b. ten grams of gravity pull | d. ten times the pull of gravity | 40.... |

CHAPTER 10: Our Daily Weather

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. The spinning and unequal heating of the earth cause
 - a. air pressure
 - b. rain
 - c. winds
 - d. rotation1.....
2. The weather changes that affect us from day to day occur in
 - a. the troposphere
 - b. the ionosphere
 - c. the stratosphere
 - d. outer space2.....
3. Molecules move fastest and are farthest apart in
 - a. water
 - b. liquids
 - c. solids
 - d. gases3.....
4. A weatherman speaks of the amount of water vapor in air as the
 - a. humidity
 - b. pressure
 - c. temperature
 - d. volume4.....
5. A certain amount of air is heaviest when it is
 - a. cold and moist
 - b. cold and dry
 - c. warm and moist
 - d. warm and dry5.....
6. The horse latitudes are areas of
 - a. high winds near the equator
 - b. high winds near the Tropic of Capricorn
 - c. calms near the equator
 - d. calms near the Tropic of Cancer6.....
7. Winds in the Northern Hemisphere are twisted to the
 - a. left
 - b. north
 - c. right
 - d. south7.....
8. Artificial rain or snow may be produced by seeding clouds with
 - a. dry ice
 - b. cold water
 - c. table salt
 - d. steam8.....
9. In the United States the prevailing winds are
 - a. doldrums
 - b. westerlies
 - c. trade winds
 - d. polar winds9.....
10. When air is heated it
 - a. contracts and falls
 - b. contracts and rises
 - c. expands and falls
 - d. expands and rises10.....
11. Near the seashore in winter, winds blowing across the water
 - a. cause land breezes in the day
 - b. cause sea breezes at night
 - c. warm the nearby land
 - d. cool the nearby mountains11.....
12. The earth, unlike the moon, stays warm after sundown mainly because of its
 - a. oceans
 - b. atmosphere
 - c. mountains
 - d. valleys12.....

13. One process by which a liquid changes to a gas is
 - a. evaporation
 - b. dew formation
 - c. condensation
 - d. precipitation13...
14. Clouds made up of drops of water that do not form ice even though they are below the freezing point of water
 - a. produce fog
 - b. produce hail
 - c. are supercooled
 - d. contain snow14...
15. The heaviest dews form on nights that are
 - a. foggy and damp
 - b. warm and humid
 - c. cloudy, cold, and damp
 - d. clear, dry, and cloudless15...
16. Among the following, the term that includes all the others is
 - a. precipitation
 - b. rain
 - c. snow
 - d. water cycle16...
17. The higher the temperature of the air, the
 - a. greater the pressure of the air
 - b. more water vapor the air can hold
 - c. less the chance of droughts
 - d. less evaporation takes place17...

Read carefully the following paragraph; then complete statements 18 to 20.

Sir Edmund Hillary and Tenzing Norkay reached the top of Mount Everest on May 29, 1953. They were the first men ever to climb this 29,000-foot mountain successfully.

18. The main reason it became harder for the men to breathe as they climbed higher and higher was the
 - a. lower air pressure
 - b. lower moisture content
 - c. higher air pressure
 - d. higher moisture content18...
19. Even though it was almost summer, the top of this mountain was still covered with deep snow because
 - a. the mountaintop is above the clouds
 - b. the mountaintop is in the ionosphere
 - c. clouds prevented melting of the snow
 - d. the air was below 32° F19...
20. At different times during the climb, the men were protected from the full strength of the sun's rays by each of the following except
 - a. dust
 - b. clouds
 - c. air pressure
 - d. water vapor20...

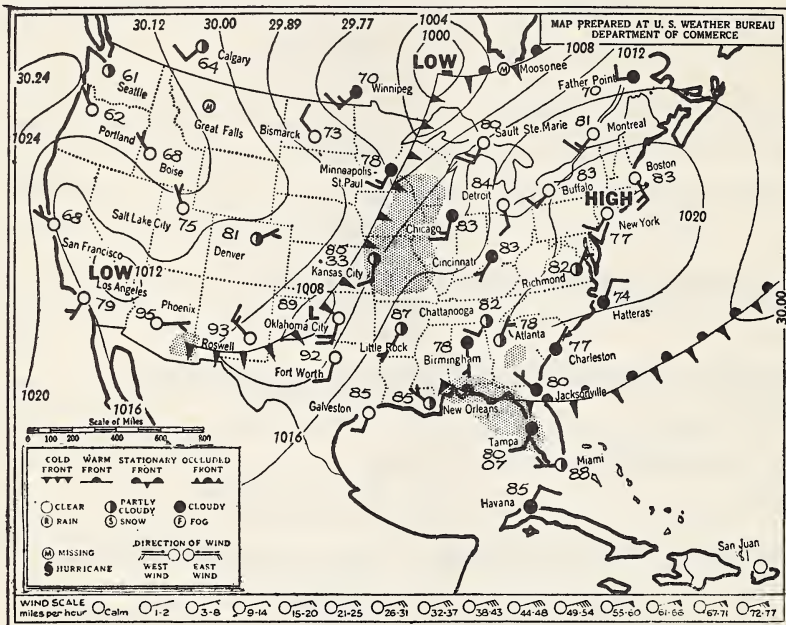
CHAPTER 11: Predicting Weather Changes

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. The boundary line between two different types of air masses is a
 - a. cyclone
 - b. front
 - c. hurricane
 - d. storm1.....
2. Beaufort arrows are used to show
 - a. air pressure
 - b. humidity
 - c. wind speed
 - d. temperature2.....
3. A rising barometer is usually a sign of
 - a. fair weather
 - b. a low
 - c. rainstorms
 - d. cyclones3.....
4. A small but violent storm with winds that whirl as fast as 500 miles an hour is a
 - a. high
 - b. hurricane
 - c. tornado
 - d. tropical cyclone4.....
5. On a weather map isobars connect places having the same
 - a. wind speed
 - b. temperature
 - c. rainfall
 - d. air pressure5.....
6. Readings of the upper air can be made with the special instruments in
 - a. an anemometer
 - b. a mercury barometer
 - c. a radiosonde
 - d. a weather vane6.....
7. At sea level normal air pressure is equal to about
 - a. 2 atmospheres
 - b. 30 inches of mercury
 - c. 34 feet of alcohol
 - d. 980 millibars7.....
8. Of the following, each is an instrument used in weather forecasting except the
 - a. barograph
 - b. theodolite
 - c. rain gauge
 - d. isotherm8.....
9. The "mare's tail" or "witch's broom" clouds that form very high in the sky are
 - a. nimbus clouds
 - b. cirrus clouds
 - c. cumulus clouds
 - d. stratus clouds9.....
10. When using a psychrometer, you usually find the temperature shown on the wet-bulb thermometer to be
 - a. lower than that on the dry-bulb thermometer
 - b. the same as that on the dry-bulb thermometer
 - c. slightly higher than that on the dry-bulb thermometer
 - d. twice as high as that on the dry-bulb thermometer10.....
11. If a mass of warm, moist air is cooled rapidly, its relative humidity
 - a. decreases
 - b. increases
 - c. goes over 100 per cent
 - d. remains the same11.....
12. An altimeter is a type of
 - a. aneroid barometer
 - b. anemometer
 - c. alcohol thermometer
 - d. psychrometer12.....
13. A Tropical Maritime air mass usually brings
 - a. cold and dry weather
 - b. cold and moist weather
 - c. warm and dry weather
 - d. warm and moist weather13.....

14. Of the following, each is a form of precipitation except
- hail
 - rain
 - dew
 - snow
- 14...
15. An instrument used to measure and make a permanent record of temperature is
- an isotherm
 - a thermograph
 - a maximum-minimum thermometer
 - a Fahrenheit thermometer
- 15...
16. Among the following, the term that does not belong with the others is
- warm front
 - cold front
 - sudden rainstorms
 - thunderhead clouds
- 16...

Study carefully the weather map below; then complete statements 17 to 20.



17. When the map was drawn, the air pressure at San Francisco, California was
- 30.12 inches
 - 68 inches
 - 1016 millibars
 - 1024 millibars
- 17...
18. This weather map shows the winds near Winnipeg, Canada, blowing mainly
- clockwise
 - counterclockwise
 - from east to west
 - from south to north
- 18...
19. According to this map, the highest winds among the following are those around
- Boston, Massachusetts
 - Bismarck, North Dakota
 - Little Rock, Arkansas
 - Seattle, Washington
- 19...
20. This weather map shows a cold front extending from
- New Orleans, Louisiana, to Jacksonville, Florida
 - New Orleans, Louisiana, into the Atlantic Ocean
 - Roswell, New Mexico, to beyond Moosonee, Canada
 - Roswell, New Mexico, to near Winnipeg, Canada
- 20...

CHAPTER 12: Weather by the Season

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. A mixture of fog and smoke may produce

a. sleet	c. frost	
b. smog	d. dew	1.....

2. The season during which most hurricanes occur is

a. spring	c. autumn	
b. summer	d. winter	2.....

3. One reason we have seasons is that the earth

a. is tilted on its axis	c. has gravitational pull	
b. rotates on its axis	d. is spherical	3.....

4. At Denver, Colorado, the rays of the sun are most slanted on

a. January 1	c. September 23	
b. March 21	d. December 21	4.....

5. During a severe lightning storm, it is safe to

a. work in an open field	c. stay in a swimming pool	
b. stand under a tree	d. sit in an all-metal car	5.....

6. At noon on March 21 the sun is directly over the

a. equator	c. Tropic of Cancer	
b. North Temperate Zone	d. Tropic of Capricorn	6.....

7. The monsoons of India are seasonal

a. droughts and winds	c. rains and winds	
b. droughts and cold weather	d. rains and cold weather	7.....

8. On December 21 there are twenty-four hours of darkness

a. at the North Pole	c. in the South Temperate Zone	
b. at the equator	d. in the Torrid Zone	8.....

9. In the United States the sun seems to rise directly in the east and set directly in the west on

a. January 1	c. the summer solstice	
b. Thanksgiving day	d. the spring equinox	9.....

10. In Chicago between March 21 and September 23

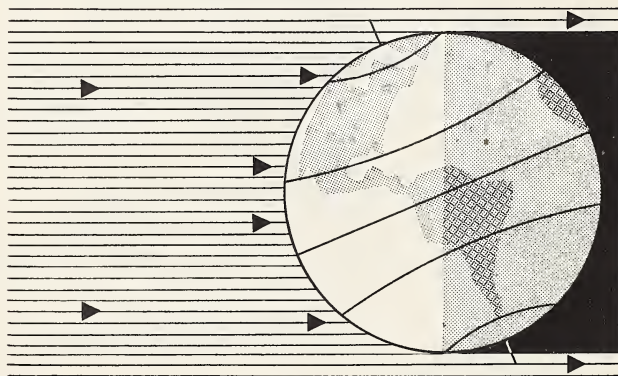
a. shadows are longest at noon	c. days grow longer only	
b. many ultraviolet rays reach the earth	d. days grow shorter only	10.....

11. In the Southern Hemisphere December 21 is the date of the

a. summer solstice	c. spring equinox	
b. winter solstice	d. autumnal equinox	11.....

12. During winter, North Dakota has
 - a. an average temperature of 50°F
 - b. an average temperature of 68°F
 - c. longer nights than days
 - d. days and nights of equal length12.....
13. The sun is the farthest north at noon on
 - a. March 21
 - b. June 21
 - c. September 23
 - d. December 2113.....
14. All animals that go south in the winter
 - a. are cold-blooded
 - b. are dormant
 - c. hibernate
 - d. migrate14.....
15. In winter the earth's axis is tilted at an angle of
 - a. 0 degrees
 - b. 23.5 degrees
 - c. 41 degrees
 - d. 66.5 degrees15.....
16. Scientists have shown that lightning
 - a. is a discharge of electricity
 - b. destroys lightning rods
 - c. comes after thunder
 - d. cools the air in its path16.....
17. Nights in the Northern and Southern Hemispheres are of equal length on both
 - a. January 21 and March 21
 - b. March 21 and September 23
 - c. June 21 and December 21
 - d. September 23 and June 2117.....

Study carefully the following diagram; then complete statements 18 to 20.



18. During the season shown in the diagram, the United States has
 - a. less than 8 hours of daylight
 - b. between 8 and 12 hours of daylight
 - c. more than 12 hours of daylight
 - d. 24 hours of daylight18.....
19. When the earth is in the position shown, the season in the Northern Hemisphere is
 - a. summer
 - b. winter
 - c. spring
 - d. autumn19.....
20. During the season shown, the sun's rays appear to slant least at the
 - a. North Pole
 - b. South Pole
 - c. Tropic of Capricorn
 - d. Tropic of Cancer20.....

CHAPTER 13: Protecting Yourself Against the Weather

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

- 1. Two fuels that do not leave ashes when they burn are
 - a. coal and gas
 - b. oil and wood
 - c. gas and oil
 - d. wood and coal1.....
- 2. To start a fire it is not necessary to have
 - a. nitrogen
 - b. oxygen
 - c. heat
 - d. fuel2.....
- 3. Compared with light-colored clothes, dark-colored clothes absorb
 - a. less moisture
 - b. less heat
 - c. more moisture
 - d. more heat3.....
- 4. A type of central heating system that cools very slowly is a
 - a. hot-water system
 - b. hot-air system
 - c. warm-air system
 - d. steam heating system4.....
- 5. In a large building, the central air-conditioning system does not give the best results when
 - a. a refrigerant is used
 - b. windows are open
 - c. the air is filtered
 - d. ducts are necessary5.....
- 6. Carbon dioxide can be used in a fire extinguisher because carbon dioxide is
 - a. a rather heavy liquid
 - b. composed of carbon and oxygen
 - c. given off when wood burns
 - d. heavier than air6.....
- 7. In a house having a hot-air heating system, heat travels mainly by
 - a. conduction
 - b. insulation
 - c. convection
 - d. radiation7.....
- 8. Of the following, each is a good insulator for homes except
 - a. poured concrete
 - b. glass wool
 - c. dead air spaces
 - d. rock wool8.....
- 9. Water vapor can be added to air by a
 - a. filter
 - b. humidifier
 - c. duct
 - d. thermostat9.....
- 10. In spontaneous combustion, fires may be started by the heat of
 - a. convection currents
 - b. ignition
 - c. radiation
 - d. slow oxidation10.....
- 11. The most comfortable indoor weather can be produced by circulating air at about
 - a. 50° F and 68% humidity
 - b. 68° F and 76% humidity
 - c. 70° F and 50% humidity
 - d. 86° F and 50% humidity11.....
- 12. When a liquid evaporates from a table surface, the liquid
 - a. must be at 212° F
 - b. removes heat from the table
 - c. changes from a gas
 - d. actually becomes cooler12.....

13. When used to put out a fire, an asbestos blanket
 - a. cuts off the air supply
 - b. changes the kindling temperature
 - c. keeps the heat in the fire
 - d. radiates heat away13.....
14. The pipes of a radiator become hot mainly by
 - a. radiation
 - b. convection
 - c. conduction
 - d. insulation14.....
15. Of the following, each may be a fire hazard in the home except
 - a. trash and oily rags
 - b. a pile of damp newspapers
 - c. a frayed electric wire
 - d. a refrigerator using Freon15.....
16. If clothes were really worn for warmth instead of for fashion, a woman would wear
 - a. very tight-fitting gloves
 - b. only one layer of wool clothing
 - c. open-toed shoes at all times
 - d. her fur coat inside out16.....
17. A gas that is harmful to people is given off when they use a
 - a. carbon dioxide fire extinguisher
 - b. carbon tetrachloride fire extinguisher
 - c. soda-acid fire extinguisher
 - d. soda-acid-foam fire extinguisher17.....
18. In general, we feel coolest in clothing that is
 - a. lightweight and loosely woven
 - b. lightweight and tightly woven
 - c. closely woven and loose-fitting
 - d. closely woven and tight-fitting18.....
19. Water can be used to extinguish many kinds of fires because it
 - a. removes the fuel
 - b. raises the kindling temperature
 - c. adds oxygen
 - d. lowers the temperature19.....
20. A new house with steam heat may have
 - a. an expansion tank
 - b. an open-pipe system
 - c. radiant heating
 - d. registers20.....

UNIT 4: Understanding the Earth's Weather

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. Among the following, molecules move fastest and are farthest apart in

a. air	c. stone	
b. milk	d. wood	1.....

2. Near the equator the prevailing winds are

a. northerlies	c. trade winds	
b. southerlies	d. westerlies	2.....

3. Clouds that are shaped like heaps of white, fluffy wool are

a. cirrus clouds	c. nimbus clouds	
b. cumulus clouds	d. stratus clouds	3.....

4. If you are holding a barometer that reads 28 inches of mercury, you are probably

a. deep in a mine	c. at sea level	
b. on a mountain	d. at the North Pole	4.....

5. On a weather map places having the same temperatures are connected by

a. Beaufort arrows	c. isobars	
b. millibars	d. isotherms	5.....

6. Heat travels along a heated test tube by

a. conduction	c. insulation	
b. convection	d. radiation	6.....

7. Relative humidity can be measured by the wet-bulb and dry-bulb thermometers of

a. altimeters	c. maximum-minimum thermometers	
b. psychrometers	d. theodolites	7.....

8. Changes in our daily weather result from changes in

a. outer space	c. the troposphere	
b. the ionosphere	d. the stratosphere	8.....

9. One reason for the change of seasons is the

a. changing angle of the sun's rays	c. lengthening of the shadows	
b. changing direction of prevailing winds	d. rotation of the earth	9.....

10. Winds are twisted or steered by the earth's

a. revolution	c. gravity	
b. rotation	d. velocity	10.....

11. In the Northern Hemisphere September 23 is the date of the

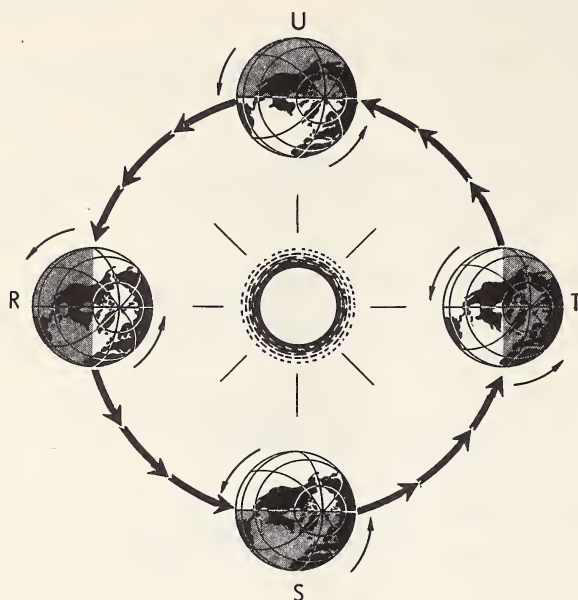
a. summer solstice	c. spring equinox	
b. winter solstice	d. autumnal equinox	11.....

12. The central heating system of a house with registers in its floors is a
 - a. steam heating system
 - b. radiant heating system
 - c. hot-air heating system
 - d. hot-water heating system12.....
13. On a warm, humid night that is not windy,
 - a. dew often forms
 - b. fog may form
 - c. frost often forms
 - d. sleet may form13.....
14. To keep as cool as possible in the summertime, wear clothing that
 - a. is light-colored
 - b. is tight-fitting
 - c. is closely woven
 - d. has many dead air spaces14.....
15. An anemometer is used to measure
 - a. air pressure
 - b. relative humidity
 - c. wind speed
 - d. wind direction15.....
16. A liquid that cools by rapid evaporation is a good
 - a. convector
 - b. humidifier
 - c. insulator
 - d. refrigerant16.....
17. At noon on June 21 the sun is directly above the
 - a. Tropic of Cancer
 - b. Tropic of Capricorn
 - c. equator
 - d. North Pole17.....
18. At the seashore on most summer nights
 - a. sea breezes blow
 - b. land breezes blow
 - c. lightning forms
 - d. smog forms18.....
19. Normal air pressure at sea level is about
 - a. 30 atmospheres
 - b. 70 per cent
 - c. 76 pounds per square inch
 - d. 1000 millibars19.....
20. Carbon dioxide can be used in fire extinguishers because it
 - a. lowers the kindling temperature
 - b. destroys the fuel
 - c. cuts off the air supply
 - d. releases some oxygen20.....
21. In the United States there are more hours of daylight on October 21 than on
 - a. May 21
 - b. August 1
 - c. September 23
 - d. December 2121.....
22. The boundary line between a mass of cold air and an advancing mass of warm air is a
 - a. high
 - b. low
 - c. warm front
 - d. cold front22.....
23. Among the following, the term that is not related to the others is
 - a. insulation
 - b. kindling temperature
 - c. slow oxidation
 - d. spontaneous combustion23.....
24. A falling barometer is usually a sign of
 - a. dry weather
 - b. fair weather
 - c. rainy weather
 - d. colder weather24.....

[UNIT 4 TEST, continued]

- | | | | |
|-----|---|----------------------------------|---------|
| 25. | The region or belt of calms near the equator is the | c. Tropical Continentals | 25..... |
| | a. horse latitudes | d. Tropical Maritimes | |
| | b. doldrums | | |
| 26. | For comfortable indoor weather the humidity of the air should be about | c. 50 per cent | 26..... |
| | a. 30 inches | d. 68 per cent | |
| | b. 34 feet | | |
| 27. | Warm air, compared with an equal volume of cold air, | c. blows clockwise | 27..... |
| | a. is heavier | d. blows counterclockwise | |
| | b. holds more moisture | | |
| 28. | The sun heats the earth mainly by | c. reflection | 28..... |
| | a. conduction | d. radiation | |
| | b. convection | | |
| 29. | When the humidity of the air is high, water from your body | c. evaporates easily | 29..... |
| | a. evaporates slowly | d. cannot evaporate | |
| | b. evaporates rapidly | | |
| 30. | Among the following, the term that includes all the others is | c. cyclone | 30..... |
| | a. typhoon | d. tornado | |
| | b. hurricane | | |
| 31. | A certain volume of air has the lowest pressure when it is | c. cold and dry | 31..... |
| | a. warm and dry | d. cold and moist | |
| | b. warm and moist | | |
| 32. | When trees shed all their leaves in winter, the trees | c. hibernate | 32..... |
| | a. are dormant | d. migrate | |
| | b. cannot live | | |
| 33. | A process by which liquid water becomes water vapor is | c. precipitation | 33..... |
| | a. seeding | d. evaporation | |
| | b. supercooling | | |
| 34. | A Polar Continental air mass usually brings | c. warm and moist weather | 34..... |
| | a. cold and moist weather | d. warm and dry weather | |
| | b. cold and dry weather | | |
| 35. | At noon in New York City on June 21, compared with any other day in the year, | c. the sun is highest in the sky | 35..... |
| | a. the earth's axis is least tilted | d. shadows are the longest | |
| | b. the sun's rays are most slanted | | |
| 36. | If a building is air conditioned, air does <u>not</u> | c. remain in motion | 36..... |
| | a. become cooled | d. remain moist | |
| | b. become filtered | | |

Study carefully the following diagram; then complete statements 37 to 40.



37. The earth is in position R of the diagram on
 a. December 21
 b. March 21
 c. June 21
 d. September 23
 37.....
38. The diagram above does not show any part of the
 a. Tropic of Capricorn
 b. Tropic of Cancer
 c. Torrid Zone
 d. North Temperate Zone
 38.....
39. In this diagram all points on the earth have twelve hours of daylight when the earth is in positions
 a. R and T
 b. R and U
 c. S and T
 d. S and U
 39.....
40. As the earth moves from position S to position T, the earth's axis tilts
 a. toward the sun
 b. away from the sun
 c. 0 degrees
 d. $66\frac{1}{2}$ degrees
 40.....

TEST OF INTERPRETATION 2 (Units 2-4)

- A. Study carefully the table below. Then complete statements 1 to 5 by placing in each numbered space at the right the letter that is in front of the term you select.

DATA FOR SPACE EXPLORATION

	Sun	Moon	Mercury	Venus	Earth	Mars	Jupiter	Saturn	Uranus	Neptune	Pluto
Diameter (miles)	870,000	2,170	3,100	7,750	7,970	4,140	87,300	71,000	32,000	31,000	3,700
Escape Velocity (miles per second)	387	1.5	2.6	6.4	7	4	37	22	13	14	?
Surface Gravity (Earth = 1)	28	0.16	0.36	0.86	1	0.40	2.64	1.17	0.91	1.12	?
Eccentricity of Orbit (Circle = 0)	-	0.054	0.206	0.007	0.017	0.093	0.048	0.056	0.047	0.009	0.248
Inclination to Ecliptic* (degrees)	-	5.8	7	3.2	-	1.5	1.18	2.3	0.46	1.46	17.8

*ecliptic is the plane of the earth's orbit.

Adapted from *The Challenge of Space Exploration*, National Aeronautics and Space Administration, United States of America, 1959.

- The escape velocity for rockets fired from the earth is
 - 7 miles per hour
 - 7 miles per second
 - 387 miles per hour
 - 387 miles per second

1.....
- The planet with the greatest known surface gravity is
 - Mercury
 - Earth
 - Jupiter
 - Saturn

2.....
- The planet whose orbit is most nearly a circle is
 - Venus
 - Earth
 - Mars
 - Pluto

3.....
- The planet with the greatest inclination to the plane of the earth's orbit is
 - Venus
 - Uranus
 - Neptune
 - Pluto

4.....
- The theory that the larger a body the greater its escape velocity does not agree with the data for
 - the Sun
 - the Moon
 - Earth
 - Uranus

5.....

B. Read carefully the following paragraph; then complete statements 6 to 10.

To measure the temperature of a substance you could use any one of three different temperature scales—the Fahrenheit, the centigrade, and the Absolute (Kelvin) scales. On the Fahrenheit temperature scale, the boiling point of water is 212° and the freezing point of water is 32° ; on the centigrade temperature scale, the boiling point of water is 100° and its freezing point is 0° ; on the Absolute temperature scale, the boiling point of water is 373° and its freezing point is 273° . Scientists believe that the temperature can never be lower than 0° Absolute or -273° centigrade.

- | | | | |
|---|----------------------------|------------------------------|---------|
| 6. A temperature of 32° on the Fahrenheit scale would be measured by a centigrade thermometer as | a. 0° | c. 100° | 6..... |
| | b. 32° | d. 273° | |
| 7. The highest temperature among the following is | a. 90° Absolute | c. 90° centigrade | 7..... |
| | b. 90° Kelvin | d. 90° Fahrenheit | |
| 8. Between the freezing point and the boiling point of water on a centigrade thermometer there are | a. 100 degrees | c. 212 degrees | 8..... |
| | b. 180 degrees | d. 273 degrees | |
| 9. A temperature of 0° Absolute is equal to a temperature of | a. 0° Fahrenheit | c. 32° Fahrenheit | 9..... |
| | b. 0° centigrade | d. -273° centigrade | |
| 10. Scientists believe it is impossible to have a temperature of | a. -1° centigrade | c. 374° Fahrenheit | 10..... |
| | b. -1° Absolute | d. 374° Kelvin | |

C. In the space at the right of each pair of phrases in statements 11 to 15, write the letter

- if the phrase in Column A refers to an amount that is greater than the amount in Column B
- if the phrase in Column B refers to an amount that is greater than the amount in Column A
- if the two phrases refer to equal amounts
- if there is not enough information to compare the amounts

Column A

Column B

- | | | |
|--|---|---------|
| 11. The hours of daylight in the Southern Hemisphere on January 1 | 11. The hours of daylight in the Northern Hemisphere on January 1 | 11..... |
| 12. The volume of blood pumped by the right ventricle of the heart | 12. The volume of blood pumped by the left ventricle of the heart | 12..... |
| 13. The per cent of carbon dioxide in air you inhale | 13. The per cent of carbon dioxide in air you exhale | 13..... |
| 14. The number of isotherms on a weather map | 14. The number of isobars on the same weather map | 14..... |
| 15. The height of the highest mountain on earth | 15. The depth of the deepest part of the ocean | 15..... |

[TEST OF INTERPRETATION 2 (UNITS 2-4) continued]

D. Read carefully the following paragraph; then follow the directions below it to complete statements 16 to 20.

More than 4,500,000 people outside the United States have been immunized against polio with a live vaccine developed by Dr. Albert Sabin. The tests indicate thus far that one dose of this vaccine may give lifelong protection against the three known types of polio. The price of this vaccine, which is taken by mouth, is about one tenth the price of the Salk vaccine. More controlled studies are needed to learn whether the weakened virus of the Sabin vaccine changes to a dangerous type after passing through the digestive tract.

In the space at the right of each statement below, write the letter

- a. if the statement is true on the basis of information given in the paragraph above
- b. if the statement is true but not on the basis of information given in the paragraph above
- c. if the statement is false on the basis of information given in the paragraph above
- d. if the statement is false but not on the basis of information given in the paragraph above

- | | |
|--|---------|
| 16. The Sabin vaccine contains live virus. | 16..... |
| 17. One reason that the tests were not carried out in the United States is that so many people in the United States had already received the Salk vaccine for polio. | 17..... |
| 18. Sabin proved that the weakened virus changes to a dangerous type after passing through the digestive tract. | 18..... |
| 19. The Salk vaccine is more expensive than the Sabin vaccine. | 19..... |
| 20. The Sabin vaccine, unlike the Salk vaccine, gives protection against the three known types of polio. | 20..... |



CHAPTER 14: Atoms—Building Blocks of the Universe

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. All matter has a definite
 - a. size
 - b. shape
 - c. weight
 - d. luster
 1.....
2. Sugar is an example of
 - a. an atom
 - b. an element
 - c. a mixture
 - d. a compound
 2.....
3. Nearly the entire weight of an oxygen atom is in its
 - a. nucleus
 - b. neutrons
 - c. protons
 - d. electrons
 3.....
4. The first scientist to state that atoms of different elements differ in weight was
 - a. Chadwick
 - b. Rutherford
 - c. Democritus
 - d. Dalton
 4.....
5. Splitting a molecule of water into hydrogen and oxygen is an example of
 - a. a physical change
 - b. a chemical change
 - c. making a compound
 - d. making a mixture
 5.....
6. An atom of ordinary hydrogen contains
 - a. one proton and one electron
 - b. one proton and one neutron
 - c. one proton and two electrons
 - d. one neutron and one electron
 6.....
7. Among the following, the term that includes all the others is
 - a. liquid
 - b. solid
 - c. matter
 - d. gas
 7.....
8. A glowing splint bursts into flames when placed in a bottle of
 - a. hydrogen
 - b. oxygen
 - c. carbon dioxide
 - d. water vapor
 8.....
9. A particle that weighs about as much as a proton is the
 - a. neutron
 - b. molecule
 - c. helium particle
 - d. electron
 9.....
10. Radium, which throws off small particles and rays, is
 - a. a compound
 - b. a mixture
 - c. invisible
 - d. radioactive
 10.....
11. The smallest particle of water that has the properties of water is
 - a. an atom of water
 - b. a drop of water
 - c. a molecule of water
 - d. a nucleus of water
 11.....
12. By 1960, the total number of known elements was
 - a. 10
 - b. 82
 - c. 92
 - d. 102
 12.....

13. Among the following, the substance that is not an element is
 - a. sodium
 - b. air
 - c. nitrogen
 - d. chlorine13...
14. The nucleus of a helium atom contains
 - a. neutrons and electrons
 - b. protons and electrons
 - c. protons and neutrons
 - d. protons, neutrons, and electrons14...
15. A Wilson cloud chamber traces helium particles by
 - a. showing their paths
 - b. finding their source
 - c. taking their picture
 - d. increasing their rays15...
16. When a scientist speaks of carbon-12, he means a carbon atom with
 - a. an atomic weight of 12
 - b. a radioactivity number of 12
 - c. 12 electrons
 - d. 12 protons16...
17. Atom is to element as molecule is to
 - a. matter
 - b. mixture
 - c. compound
 - d. solid17...

Read carefully the following paragraph; then complete statements 18 to 20.

A student stirred together iron filings and sulfur in the amounts in which they combine chemically. Later he heated them in a test tube until they were completely combined as iron sulfide.

18. By stirring iron and sulfur together in a test tube the student produced
 - a. an element
 - b. new atoms
 - c. a compound
 - d. a mixture18...
19. By heating the iron and sulfur the student produced
 - a. a compound
 - b. a mixture
 - c. an atom
 - d. an element19...
20. A magnet held near the test tube after it had cooled attracted
 - a. iron sulfide
 - b. none of these
 - c. iron filings
 - d. sulfur20...

CHAPTER 15: Splitting the Atom

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. The first atomic bomb ever tested was exploded by bringing together small amounts of
a. neptunium
b. uranium-235
c. uranium-238
d. plutonium
1.....
2. The control rods of the first atomic pile were made of
a. plutonium
b. uranium
c. cadmium
d. carbon
2.....
3. Two of the first scientists to discover that uranium splits into two lighter elements were
a. Frisch and Meitner
b. Fermi and Conant
c. Einstein and Compton
d. Bohr and Oppenheimer
3.....
4. In an atomic pile uranium-238 changes into
a. uranium-235
b. radium
c. helium
d. neptunium
4.....
5. The cyclotron was designed to
a. produce pure uranium-235
b. generate electric power
c. make heavy water
d. speed up atomic particles
5.....
6. Radioactivity can be measured with
a. Geiger counters
b. atomic reactors
c. betatrons
d. nuclear reactors
6.....
7. Most scientists believe that the heat and light radiated by the sun result from the
a. burning of fuel elements
b. radioactivity of helium
c. fusion of hydrogen
d. fission of uranium
7.....
8. A compound of uranium found in the earth is
a. pitchblende
b. neptunium
c. plutonium
d. cobalt
8.....
9. Flaws in metal castings are sometimes located by using photographic film and radioactive
a. iron
b. carbon
c. table salt
d. cobalt
9.....
10. In atomic fission the weight that appears to be lost is actually changed into
a. critical mass
b. energy
c. dust
d. a new element
10.....
11. The power plant of the atomic-powered submarine *Nautilus* includes each of the following except a
a. cyclotron
b. heat exchanger
c. nuclear reactor
d. special circulating fluid
11.....

12. The bombarding of uranium-235 with slow neutrons results in
 - a. the formation of plutonium
 - b. the formation of tritium
 - c. atomic fission
 - d. atomic fusion12....
13. Radioactive dust from an atomic bomb or hydrogen bomb explosion reaches the earth as
 - a. cosmic rays
 - b. fall-out
 - c. tumors
 - d. X rays13....
14. Among the following, the term that does not belong with the others is
 - a. cyclotron
 - b. spiral track
 - c. dees
 - d. porous screens14....
15. The metal usually used to stop deadly rays from a nuclear reactor is
 - a. iron
 - b. lead
 - c. cobalt
 - d. steel15....
16. We can produce and control a chain reaction in
 - a. an atomic pile
 - b. a cyclotron
 - c. an atomic bomb
 - d. a hydrogen bomb16....
17. Hydrogen-2 is usually obtained from
 - a. plutonium
 - b. heavy water
 - c. tritium
 - d. carbon-1417....
18. When uranium-235 is brought to critical mass, it
 - a. becomes uranium-238
 - b. begins to give off protons
 - c. causes an explosion
 - d. becomes radioactive18....
19. A doctor may give a patient radioactive iodine to study his
 - a. thyroid gland
 - b. bones
 - c. red blood cells
 - d. pancreas19....
20. A hydrogen bomb, as compared to an atomic bomb,
 - a. has a critical mass
 - b. produces fewer gamma rays
 - c. involves radioactivity
 - d. produces more helium20....

CHAPTER 16: Common Chemicals Around You

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. An element usually obtained from sea water is

a. platinum

b. magnesium

c. gold

d. copper

1.....
2. The most abundant element in the earth's crust is

a. aluminum

b. uranium

c. oxygen

d. silicon

2.....
3. About twenty per cent of the air is

a. oxygen

b. carbon dioxide

c. argon

d. nitrogen

3.....
4. Limestone caverns were formed by the action of underground water containing

a. potassium

b. methane

c. carbon dioxide

d. calcium

4.....
5. Water is hard if it contains dissolved salts of magnesium or

a. sodium

b. bromine

c. copper

d. calcium

5.....
6. An element usually found by itself (not chemically combined with another element) in nature is

a. lead

b. iron

c. gold

d. copper

6.....
7. An example of a substance that is soluble in water is

a. starch

b. sugar

c. aluminum

d. glass

7.....
8. A gas dissolved in soda pop is

a. neon

b. hydrogen

c. argon

d. carbon dioxide

8.....
9. Among the following, the term that does not belong with the others is

a. soft water

b. hard water

c. rain water

d. distilled water

9.....
10. Any substance found naturally in the earth's crust is

a. a mineral

b. an element

c. an ore

d. a rock

10.....
11. In trying to reduce tooth decay, some communities are adding to their water compounds of

a. chlorine

b. fluorine

c. bromine

d. iodine

11.....
12. Water can be made free of almost all impurities by

a. distillation

b. evaporation

c. freezing

d. boiling

12.....

13. For use in industry, pure oxygen is obtained from
 - a. green plants
 - b. sand
 - c. water
 - d. liquid air13.....
14. In general, as the temperature of a solution increases, the liquid can dissolve
 - a. the same amount of gas
 - b. more of a gas
 - c. more of a solid substance
 - d. less of a solid substance14.....
15. Oxygen is not useful
 - a. in acetylene welding outfits
 - b. in preventing simple goiter
 - c. to pilots in high-flying planes
 - d. in oxidizing food in our cells15.....
16. The point beyond which no more salt will dissolve in a glass of water at a certain temperature is the
 - a. saturation point
 - b. evaporation point
 - c. condensation point
 - d. distillation point16.....
17. Compared to soft water, hard water is less desirable for household uses chiefly because
 - a. it contains iodine compounds
 - b. it is not pure
 - c. of its action on soap
 - d. of its bacterial count17.....

In each numbered space at the right of statements 18 to 20 place the letter of the most closely related term below.

- a. evaporation
- b. solution
- c. distillation
- d. suspension

18. Every glass of sea water contains about a teaspoonful of salt. 18.....
19. A puddle of rain water dries up. 19.....
20. Each year soil carried by the Mississippi River builds the river bed 250 feet further out into the Gulf of Mexico. 20.....

CHAPTER 17: The Wealth in the Earth's Crust

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. About three-fourths of the world's oil is used for
 - a. producing electricity
 - b. heating homes
 - c. transportation
 - d. making medicines1.....
2. The Frasch process, which requires compressed air and hot water, is used to mine
 - a. sulfur
 - b. iron
 - c. gold
 - d. magnesium2.....
3. A substance used in making tiles and dishes is
 - a. sand
 - b. gravel
 - c. mud
 - d. clay3.....
4. Aluminum is obtained from its ores by using
 - a. electricity
 - b. oil
 - c. gas
 - d. coal4.....
5. Modern airplanes are made from an alloy of
 - a. aluminum and iron
 - b. aluminum and magnesium
 - c. magnesium and copper
 - d. magnesium and sulfur5.....
6. Concrete is made by mixing water with
 - a. limestone and clay
 - b. sand and limestone
 - c. clay, sand, and cement
 - d. sand, gravel, and cement6.....
7. Substances such as dyes, drugs, and food flavors have been made from
 - a. gasoline
 - b. sulfur
 - c. coal tar
 - d. peat7.....
8. A substance used in making all common types of glass is
 - a. sand
 - b. sodium
 - c. plastic
 - d. limestone8.....
9. A resource recently found in the ground under the ocean shoreline is
 - a. table salt
 - b. tideland oil
 - c. low-grade iron ore
 - d. hard coal9.....
10. Conservation of our resources means
 - a. using less of our natural resources each year
 - b. not using resources that are scarce
 - c. replacing the resources that we use
 - d. using our resources wisely and carefully10.....

In each numbered space at the right of statements 11 to 13 write the letter of the process described.

- alloying
- cracking
- galvanizing
- enameling

- | | |
|---|--------|
| 11. Iron is coated with molten zinc. | 11.... |
| 12. Gasoline is made by breaking down the large molecules of crude oil. | 12.... |
| 13. Copper is melted with zinc to make brass. | 13.... |

Select the term that best completes each statement.

14. Of the following, each is obtained by heating soft coal without air except
- | | | |
|----------------|--------------|--------|
| a. cooking gas | c. hard coal | |
| b. coal tar | d. coke | 14.... |
15. Reinforced concrete is made by using concrete and
- | | | |
|-----------------|--------------|--------|
| a. crushed rock | c. limestone | |
| b. cast iron | d. steel | 15.... |
16. Bronze is an alloy of
- | | | |
|------------------------|-------------------|--------|
| a. zinc and nickel | c. lead and zinc | |
| b. aluminum and copper | d. copper and tin | 16.... |
17. In drilling through a rock dome under which there is likely to be oil, a geologist might expect to find
- | | | |
|----------------|-------------|--------|
| a. sulfur | c. chlorine | |
| b. natural gas | d. aluminum | 17.... |

Read carefully the following paragraph; then complete statements 18 to 20.

Several students took a trip through a large steel mill where they saw iron being obtained from its ore. They also saw molten steel flowing into large pots and watched several different types of steel being made.

18. The students saw iron being taken from its ore
a. in a blast furnace
b. by dissolving the ore in water
c. by electricity
d. by using "pigs" 18.....
19. The ordinary steel flowing into the large pots had been made from iron that contained
a. no impurities
b. small amounts of copper
c. small amounts of magnesium
d. small amounts of carbon 19.....
20. The guide said that nickel and chromium are added to molten steel to make
a. armor-plate steel
b. cast iron
c. stainless steel
d. acid-proof metal 20.....

UNIT 5: Investigating the Earth's Storehouse

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. The most abundant element in the air is
a. carbon dioxide
b. oxygen
c. nitrogen
d. hydrogen
1.....
2. Matter that spreads evenly through its container is a
a. solid
b. gas
c. liquid
d. mixture
2.....
3. The scientist mainly responsible for building the first atomic pile was
a. Fermi
b. Bohr
c. Meitner
d. Frisch
3.....
4. Of the following, each is a compound except
a. water
b. air
c. sugar
d. iron sulfide
4.....
5. A proton with an electron circling about it is
a. a water molecule
b. a helium particle
c. a neutron
d. a hydrogen atom
5.....
6. Muddy water is an example of
a. a suspension
b. a mineral
c. a solution
d. an ore
6.....
7. In an atomic pile you would not expect to find
a. control rods
b. uranium-238
c. dees
d. uranium-235
7.....
8. The path of an atomic particle can be traced by
a. an atomic pile
b. a cyclotron
c. a nuclear reactor
d. a cloud chamber
8.....
9. Sulfur is mined by the use of
a. electricity
b. dynamite
c. compressed air and hot water
d. sulfuric acid and quicksand
9.....
10. The smallest particle of carbon dioxide that has the properties of carbon dioxide is
a. an atom of carbon dioxide
b. a molecule of carbon dioxide
c. a nucleus of carbon dioxide
d. an element of carbon dioxide
10.....
11. DOWmetal, which is used in airplanes, contains
a. aluminum and magnesium
b. aluminum and sulfur
c. magnesium and copper
d. steel and aluminum
11.....
12. Writing water as H_2O is a way of showing that one molecule of water contains
a. one hydrogen atom
b. two oxygen atoms
c. two atoms
d. three atoms
12.....

13. Gasoline production has been increased by the process of
 - a. distillation
 - b. plating
 - c. cracking
 - d. saturation13.....
14. The lightest particle among the following is the
 - a. electron
 - b. neutron
 - c. atom
 - d. proton14.....
15. Among the following, the term that does not belong with the others is
 - a. uranium-235
 - b. hydrogen-2
 - c. atomic bomb
 - d. chain reaction15.....
16. Large amounts of bromine are obtained from
 - a. clay
 - b. sand
 - c. liquid air
 - d. sea water16.....
17. The radioactive dust that settles after an atomic explosion is
 - a. radioactivity
 - b. cosmic rays
 - c. fall-out
 - d. critical mass17.....
18. A chemical change takes place when
 - a. water is broken up into gases
 - b. water is changed into steam
 - c. sugar dissolves in water
 - d. air becomes liquefied18.....
19. The substance produced in a blast furnace is
 - a. pig iron
 - b. cast iron
 - c. pure iron
 - d. a steel alloy19.....
20. An example of an element is
 - a. glass
 - b. sulfur
 - c. steel
 - d. bronze20.....
21. The results of Rutherford's bombarding tin with helium particles led him to conclude that the atom
 - a. contains neutrons
 - b. contains no neutrons
 - c. has weight
 - d. is mostly empty space21.....
22. When a solid dissolves in water
 - a. a solution is formed
 - b. a compound is formed
 - c. an element is formed
 - d. a suspension is formed22.....
23. Chain reactions in pure uranium-235 or plutonium can be prevented by
 - a. treating the elements with neutrons
 - b. keeping the elements cold
 - c. keeping the elements in lead containers
 - d. storing the elements in small amounts23.....
24. The nucleus of an oxygen atom contains
 - a. protons and electrons
 - b. protons and neutrons
 - c. protons only
 - d. electrons and neutrons24.....
25. Shatterproof glass is made from
 - a. sand and clay
 - b. clay and sulfur
 - c. plate glass and plastic
 - d. plate glass and sulfur25.....

[UNIT 5 TEST, continued]

26. Two or more metals melted together form
 - a. ores
 - b. alloys
 - c. compounds
 - d. salts26.....
27. Caverns may be formed when water and carbon dioxide react with underground deposits of
 - a. limestone
 - b. clay
 - c. hard coal
 - d. peat27.....
28. The tremendous energy of the H-bomb results from the
 - a. fission of hydrogen into helium
 - b. fission of hydrogen into plutonium
 - c. fusion of hydrogen into helium
 - d. fusion of hydrogen into plutonium28.....
29. Cement is made from
 - a. concrete and clay
 - b. concrete and gravel
 - c. limestone and gravel
 - d. limestone and clay29.....
30. Galvanized iron is iron that has been coated with
 - a. enamel
 - b. zinc
 - c. steel
 - d. tin30.....
31. Neptunium, which is formed when uranium-238 is bombarded with neutrons, changes rapidly into
 - a. tritium
 - b. cobalt
 - c. uranium-235
 - d. plutonium31.....
32. Coke is obtained from soft coal by
 - a. using pressure
 - b. using electricity
 - c. heating
 - d. galvanizing32.....
33. To study how green plants make food, scientists have used radioactive
 - a. radium
 - b. carbon
 - c. iodine
 - d. iron33.....
34. The largest amount of atmospheric oxygen will dissolve in a glass of water when the water is
 - a. hot
 - b. lukewarm
 - c. at room temperature
 - d. cold34.....
35. The evaporation of ancient seas has left large deposits of
 - a. salt
 - b. heavy water
 - c. oil
 - d. sulfur35.....
36. A Geiger counter is used to
 - a. produce radioactive materials
 - b. control atomic piles
 - c. trace tagged atoms
 - d. generate atomic power36.....

CHAPTER 18: Food Factories of the World

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. Green plants carry on photosynthesis in their

a. flowers	c. roots	
b. leaves	d. seeds	1.....
2. The green substance in plants is

a. epidermis	c. chlorophyll	
b. cytoplasm	d. glucose	2.....
3. During photosynthesis green plants make sugar from

a. carbon dioxide and water	c. glucose and water	
b. carbon dioxide and oxygen	d. glucose and oxygen	3.....
4. The energy plants use in making food comes from

a. chloroplasts	c. sugar	
b. starch	d. the sun	4.....
5. Sugar does not contain the element

a. oxygen	c. carbon	
b. hydrogen	d. nitrogen	5.....
6. Mushrooms cannot make their own food because they lack

a. chlorophyll	c. carbon dioxide	
b. oxygen	d. cell membranes	6.....
7. Many plants now grow on western desert land that has been made useful by

a. the carbon dioxide-oxygen cycle	c. irrigation	
b. absorption	d. evaporation	7.....
8. Water and dissolved minerals enter a plant through its

a. root hairs	c. ducts	
b. guard cells	d. stomates	8.....
9. Only in the presence of light can green plants use

a. nitrogen	c. oxygen	
b. hydrogen	d. carbon dioxide	9.....
10. Each of the following is true of a balanced, sealed aquarium except that the

a. plants and fish depend on each other	c. fish breathe out carbon dioxide	
b. plants give off hydrogen	d. fish take in oxygen	10.....
11. To enter a plant, dissolved minerals must

a. diffuse through cell membranes	c. dissolve cell membranes	
b. filter through cell membranes	d. evaporate through cell membranes	11.....

12. Some of the starch a plant makes may be made into oil and stored in
 - a. carrots
 - b. fruits
 - c. nuts
 - d. white potatoes12...
13. A plant that loses relatively little water even on hot summer days is the
 - a. beech tree
 - b. cactus
 - c. corn plant
 - d. maple tree13...
14. The food made in the leaves of a celery stalk is carried down to all parts of the plant by the
 - a. chloroplasts
 - b. stomates
 - c. pith
 - d. ducts14...
15. Plants as well as animals use the gas
 - a. hydrogen
 - b. oxygen
 - c. nitrogen
 - d. carbon dioxide15...
16. The tiny leaf openings through which gases enter and leave a plant are
 - a. stomates
 - b. cell walls
 - c. cell membranes
 - d. chloroplasts16...
17. The process of photosynthesis has been studied with radioactive
 - a. phosphorus
 - b. carbon
 - c. vitamins
 - d. radium17...

Read carefully the following paragraph; then complete statements 18 to 20.

A student wanted to find out whether it is the green or the white parts of silver-leaf geranium leaves that contain starch. After keeping the plant in sunlight for several hours, the student took off a few leaves and removed their green coloring matter. He then used iodine to test the leaves for starch.

18. The student removed the green coloring matter from the leaves by heating the leaves in
 - a. ether
 - b. bromothymol blue
 - c. alcohol
 - d. iodine18...
19. After being tested with iodine, the leaves were
 - a. blue-black in some parts
 - b. blue-black all over
 - c. green and white
 - d. white all over19...
20. From this experiment the student learned that only the green parts of the leaves can
 - a. take in carbon dioxide
 - b. take in water
 - c. give off oxygen
 - d. make starch20...

11. The special bacteria that live in nodules on the roots of legumes
 - a. decay dead plants and animals
 - b. destroy other soil bacteria
 - c. make nitrogen compounds from nitrogen
 - d. take nitrogen from nitrogen compounds11....
12. A wise farmer would leave his
 - a. muddy streams for fishing
 - b. fields bare after harvesting
 - c. flat lands unplanted every few years
 - d. fairly steep slopes for pasturing12....
13. Between rows of crops that must be cultivated clean, a wise farmer might plant a cover crop such as
 - a. corn
 - b. oats
 - c. fruit trees
 - d. tobacco13....
14. In many places the main purpose of replanting trees is to
 - a. add minerals to the soil
 - b. make the soil porous
 - c. hold the soil in place
 - d. take up soil water14....
15. The kind of soil that holds the most water is
 - a. clay
 - b. gravel
 - c. sand
 - d. humus15....
16. The Tennessee Valley Authority has helped to prevent floods by each of the following except
 - a. producing water power
 - b. replanting trees
 - c. building dams
 - d. building reservoirs16....

Read carefully the following paragraph; then complete statements 17 to 20.

Two farmers, Mr. Kay and Mr. Gordon, bought similar farms. Mr. Kay planted some of his poorer soil with clover, used proper planting to check erosion on the steep hillsides, and plowed across rather than up and down the low slopes. Mr. Gordon planted all of his land with corn and after three years found that his crop was poor and that his land was showing more erosion.

17. Mr. Kay planted clover chiefly to return to the soil compounds of
 - a. potassium
 - b. phosphorus
 - c. nitrogen
 - d. calcium17....
18. Mr. Gordon also would have increased erosion on hillsides if he had planted
 - a. grass
 - b. cover crops
 - c. trees
 - d. potatoes18....
19. By plowing across rather than up and down the low slopes, Mr. Kay was practicing
 - a. contour plowing
 - b. crop rotation
 - c. irrigation
 - d. strip cropping19....
20. One reason for Mr. Gordon's poor crops is that planting the same crop yearly on the same land causes
 - a. topsoil formation
 - b. soil depletion
 - c. a decrease in earthworms
 - d. an increase in bacteria20....

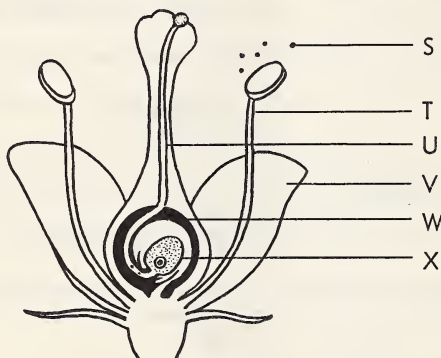
CHAPTER 20: Production Through Reproduction

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. The uniting of a sperm and an egg is
 a. incubation
 b. fertilization
 c. self-pollination
 d. cross-pollination
 1.....
2. The scientist who developed the laws of heredity from his work with garden peas was
 a. Spallanzani
 b. Weismann
 c. Mendel
 d. Redi
 2.....
3. A chick that is developing in an unhatched egg is
 a. an embryo
 b. a yolk
 c. a sperm
 d. a nucleus
 3.....
4. A single paramecium divides into two animals by
 a. layering
 b. fertilization
 c. asexual reproduction
 d. grafting
 4.....
5. A trait that is acquired is
 a. eye color in man
 b. white color in rats
 c. short horns in cattle
 d. musical knowledge in children
 5.....
6. Both fertilization and development of the offspring take place inside the mother's body in
 a. amphibians
 b. birds
 c. mammals
 d. protozoa
 6.....
7. The pollen grains of a flower contain
 a. egg nuclei
 b. sperm nuclei
 c. seeds
 d. pistillate catkins
 7.....
8. An inherited trait, such as winter-hardiness in wheat, is determined by a
 a. cell
 b. chromosome
 c. nucleus
 d. gene
 8.....
9. When a McIntosh apple twig is grafted to a Northern Spy apple tree, the twig will produce
 a. both McIntosh and Northern Spy apples
 b. only McIntosh apples
 c. a combination McIntosh-Northern Spy apple
 d. only Northern Spy apples
 9.....
10. Strawberry plants usually reproduce by
 a. runners
 b. fleshy roots
 c. sexual reproduction
 d. cuttings
 10.....
11. A new trait that results from a change in the nucleus of a sperm or an egg and that appears in later generations must be
 a. an albino
 b. a mutation
 c. an acquired trait
 d. a recessive trait
 11.....

12. When pure tall pea plants are mated with dwarf pea plants, the offspring are
 a. all tall c. all medium height 12...
 b. all dwarf d. some tall and some dwarf
13. The amount and quality of milk a cow produces are determined by
 a. genes only c. heredity only 13...
 b. environment only d. both heredity and environment
14. Among four-o'clocks, pink flowers are
 a. dominant c. hybrids 14...
 b. recessive d. mutants
15. A gardener is certain that he can grow a peach tree exactly like one he has if he
 a. uses the peach seeds c. crosses pure lines 15...
 b. uses asexual reproduction d. crosses hybrids
16. Each half of a bean seed is actually
 a. a fleshy leaf c. a plant bud 16...
 b. a seed coat d. an embryo plant
17. Female frogs are to eggs as male frogs are to
 a. tadpoles c. sperm 17...
 b. toads d. fertilized eggs

Study carefully the diagram below; then complete statements 18 to 20.



18. In this diagram the stamen of the flower is labeled
 a. S c. V 18...
 b. T d. W
19. The structure labeled X in the diagram is
 a. an ovule c. the pistil 19...
 b. the ovary d. a staminate catkin
20. A process that can occur only after the structure labeled U is produced is
 a. self-pollination c. asexual reproduction 20...
 b. cross-pollination d. fertilization

CHAPTER 21: Wise Use of Our Inheritance

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. An animal that has become extinct is the
a. bison
b. dinosaur
c. emperor penguin
d. heron
1.....
2. Most forest fires in the United States
a. are caused by careless smokers
b. are caused by severe lightning
c. are set by ignorant people
d. result from the burning of trash
2.....
3. Among the following, the insect that is a harmful pest is the
a. gypsy moth
b. bee
c. praying mantis
d. ladybird beetle
3.....
4. The stage in the life cycle of a cabbage butterfly or clothes moth when the insect is most harmful is the
a. adult stage
b. egg stage
c. pupal stage
d. larval stage
4.....
5. The Japanese beetle spread rapidly in the United States because there were no
a. Japanese plants
b. entomologists
c. boll weevils
d. natural enemies
5.....
6. The term conservation means
a. using our natural resources wisely
b. reusing our natural resources
c. saving our natural resources
d. replacing our natural resources
6.....
7. Bread mold reproduces by forming
a. eggs
b. buds
c. spores
d. seeds
7.....
8. It is against the law in some states to do each of the following except
a. destroy Mediterranean fruit flies
b. hunt quail
c. pick dogwood
d. pick mountain laurel
8.....
9. Among the following, the term that does not belong with the others is
a. smut
b. mildew
c. fungus
d. grub
9.....
10. A chemical formerly used in killing flies around cow barns but now thought to be harmful to cows and possibly to man is
a. chlordan dust
b. DDT
c. pyrethrum
d. rotenone
10.....

11. The two most numerous and widely distributed competitors of man are
 - a. insects and rodents
 - b. birds and insects
 - c. rodents and snakes
 - d. snakes and birds11...
12. An insect that goes through a nymph stage is the
 - a. beetle
 - b. fly
 - c. grasshopper
 - d. butterfly12...
13. The wildlife in a forest is in balance if
 - a. some types of organisms increase rapidly while others decrease
 - b. all types of organisms remain about the same in number
 - c. the plants increase but the animals do not
 - d. the animals outnumber the plants for several years13...
14. Contact poisons are used to kill
 - a. corn smut
 - b. wheat rust
 - c. chewing insects
 - d. sucking insects14...
15. You can prevent the growth of mold on food by each of the following except
 - a. canning the food
 - b. keeping food in a warm place
 - c. dehydrating the food
 - d. using ultraviolet lamps15...
16. The greatest damage to forests is done each year by
 - a. insects and disease
 - b. foresters and rangers
 - c. forest fires
 - d. reforestation16...
17. Of the following, each is an adaptation of organisms to their environment except
 - a. lungs for breathing
 - b. fish ladders for spawning
 - c. insects' spiracles for breathing
 - d. birds' hollow bones for flying17...

Read carefully the following paragraph; then complete statements 18 to 20.

In 1906 our government stopped the hunting of deer in the Grand Canyon National Game Preserve and offered a bounty for killing animals such as mountain lions and coyotes, which prey on deer. By 1924 the number of deer had increased from about 4,000 to 100,000. That year, deer ruined thousands of plants by eating their leaves, and thousands of deer starved to death during the winter.

18. The deer, plants, and coyotes described above form
 - a. a sanctuary
 - b. a refuge
 - c. a food chain
 - d. an environment18....
19. Mountain lions are
 - a. carnivores
 - b. herbivores
 - c. hosts
 - d. prey19....
20. In the Grand Canyon National Game Preserve the balance of nature was upset most by
 - a. deer
 - b. coyotes
 - c. mountain lions
 - d. man20....

UNIT 6: Improving the World's Food Supply

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. An insect that helps in the pollination of flowers is the
 - a. grasshopper
 - b. gypsy moth
 - c. honeybee
 - d. Japanese beetle
 1.....
2. Decaying plant and animal matter forms
 - a. clay
 - b. humus
 - c. sand
 - d. silt
 2.....
3. Pollen grains contain
 - a. sperm nuclei
 - b. egg nuclei
 - c. fertilized eggs
 - d. seeds
 3.....
4. Air enters green plants through their
 - a. ducts
 - b. stomates
 - c. root hairs
 - d. pith
 4.....
5. The practice of planting different crops in alternating rows of the same field is
 - a. contour plowing
 - b. crop rotation
 - c. irrigation
 - d. strip cropping
 5.....
6. To test a leaf for starch, add
 - a. iodine
 - b. alcohol
 - c. Benedict's solution
 - d. bromothymol blue
 6.....
7. A sperm nucleus unites with an egg nucleus during
 - a. self-pollination
 - b. cross-pollination
 - c. fertilization
 - d. asexual reproduction
 7.....
8. Insects and rodents are
 - a. without natural enemies
 - b. poorly adapted to their environment
 - c. protected by migratory treaties
 - d. man's chief competitors for food
 8.....
9. Between the two halves of a bean seed you can find the
 - a. pistillate catkin
 - b. "eye" or bud
 - c. embryo
 - d. seed coats
 9.....
10. A process by which much land has been made useful for growing plants is
 - a. erosion
 - b. irrigation
 - c. gullyng
 - d. flooding
 10.....
11. The raw materials for photosynthesis are
 - a. carbon dioxide and water
 - b. chlorophyll and carbon dioxide
 - c. glucose and chlorophyll
 - d. sunlight and water
 11.....

12. Insects breathe through their
 - a. gills
 - b. guard cells
 - c. lungs
 - d. spiracles12.
13. Among the following, the term that does not belong with the others is
 - a. runners
 - b. grafting
 - c. sexual reproduction
 - d. asexual reproduction13.
14. When green plants are placed in the dark, they produce
 - a. carbon dioxide
 - b. oxygen
 - c. starches
 - d. sugars14.
15. Planting the same crop on the same land year after year may result in
 - a. crop rotation
 - b. soil depletion
 - c. strip cropping
 - d. topsoil formation15.
16. Eggs must be fertilized before they are laid in the reproduction of
 - a. amphibians
 - b. mammals
 - c. fish
 - d. birds16.
17. Plants can only absorb minerals that are in
 - a. suspension
 - b. tiny grains
 - c. solution
 - d. gaseous form17.
18. Bacteria that add nitrates to the soil are found on the roots of
 - a. clover
 - b. corn
 - c. potatoes
 - d. wheat18.
19. In the development of a moth or butterfly the larva
 - a. becomes a pupa
 - b. becomes a nymph
 - c. lays eggs
 - d. is the adult19.
20. In flowers fertilization takes place
 - a. before pollination
 - b. after pollination
 - c. during pollination
 - d. without pollination20.
21. The language you speak and your prejudices are
 - a. caused by mutations
 - b. determined by genes
 - c. inherited traits
 - d. acquired traits21.
22. We are most likely to destroy the balance of nature by
 - a. killing off one kind of animal
 - b. making and enforcing hunting laws
 - c. building bird sanctuaries
 - d. protecting wildlife that is decreasing22.
23. Man has destroyed much of our nation's topsoil by
 - a. building dams
 - b. building reservoirs
 - c. replanting eroded slopes
 - d. leaving harvested fields bare23.
24. In flowers seeds are produced in the
 - a. petals
 - b. ovaries
 - c. pollen
 - d. stamens24.

UNIT 6 TEST, continued]

5. Fungi cannot make food since they lack
 - a. cell walls
 - b. sugars
 - c. chlorophyll
 - d. nuclei

25.....
6. Soil is kept porous through the action of
 - a. rains
 - b. earthworms
 - c. dust storms
 - d. bacteria

26.....
7. The spreading of one substance evenly through another is
 - a. diffusion
 - b. digestion
 - c. oxidation
 - d. circulation

27.....
8. Both in the light and in the dark, green plants use
 - a. hydrogen
 - b. carbon dioxide
 - c. oxygen
 - d. nitrogen

28.....
9. Every food chain includes
 - a. an insect
 - b. a fungus
 - c. a protozoon
 - d. a green plant

29.....
10. Farmers add commercial fertilizer to their soil as a source of
 - a. decay bacteria
 - b. minerals
 - c. loam
 - d. earthworms

30.....
1. Among the following, the term that includes all the others is
 - a. rust
 - b. mildew
 - c. mold
 - d. fungus

31.....
2. Both stamens and pistils are needed to produce
 - a. pollen
 - b. ovules
 - c. seeds
 - d. bulbs

32.....
3. The food substance green plants make first is
 - a. starch
 - b. sugar
 - c. fat
 - d. protein

33.....
4. The last of the following soil particles to settle out of suspension are those of
 - a. silt
 - b. gravel
 - c. sand
 - d. clay

34.....
5. To show that chlorophyll is necessary for photosynthesis, test for starch a leaf that
 - a. is partly green and partly white
 - b. is partly covered with black paper
 - c. has been in the dark
 - d. is red or deep orange

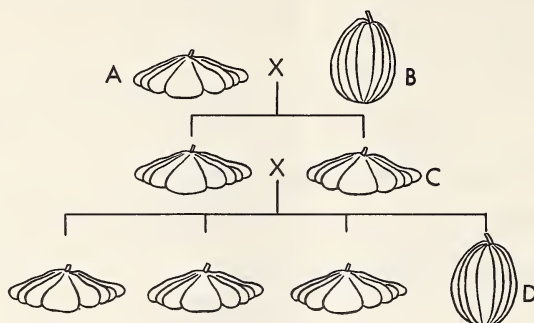
35.....
6. Pollination is completed when pollen falls on the sticky
 - a. anther
 - b. petals
 - c. pistil
 - d. stamens

36.....
7. Conservation of our forests does each of the following except
 - a. upset the carnivore-herbivore balance
 - b. aid in the prevention of floods
 - c. help in the prevention of soil erosion
 - d. aid in the conservation of wildlife

37.....

Study carefully the following paragraph and diagram; then complete statements 38 to 40.

When a farmer mates a pure flat summer squash with a pure spherical summer squash, all the offspring are flat. When he mates these hybrid flat squash, their offspring include some spherical and many flat squash.



38. In the diagram above a hybrid is labeled

- a. A
- b. B

- c. C
- d. D

38...

39. In summer squash the trait for spherical shape must be

- a. dominant
- b. recessive

- c. hybrid
- d. mutant

39...

40. The shape of pure flat summer squash depends

- a. on chromosomes for flat and for spherical shape
- b. only on chromosomes for flat shape

- c. on genes for flat and for spherical shape
- d. only on genes for flat shape

40...

TEST OF INTERPRETATION 3 (Units 5 and 6)

- A. Study carefully the information below; then complete statements 1 to 5. All statements refer to the year 1950.

According to the data below, the United States is the Free World's biggest material consumer and is using up its known reserves faster than other countries.

RESOURCE	AMOUNT CONSUMED IN 1950		PER CENT OF KNOWN RESERVES CONSUMED IN 1950	
	United States	Other Free Countries	United States	Other Free Countries
Petroleum	2,350,000,000 Barrels	1,274,000,000 Barrels	8.0%	1.2%
Rubber	1,320,000 Long Tons	825,000 Long Tons	- - -	- - -
Manganese Ore	1,000,000 Short Tons	1,400,000 Short Tons	- - -	- - -
Iron Ore (50% Fe)	130,000,000 Short Tons	105,000,000 Short Tons	5.9%	0.18%
Zinc	1,081,000 Short Tons	1,061,000 Short Tons	3.8%	3.7%
Copper	1,255,000 Short Tons	1,343,000 Short Tons	3.6%	1.1%
Lead	784,000 Short Tons	844,000 Short Tons	6.0%	4.4%

Adapted from: *Commodity Studies*, PMPC Project.

- Of the materials measured in short tons, the one used in the largest amounts in the United States was
 - rubber
 - manganese
 - iron ore
 - zinc

1.....
- Compared to the United States, other free countries used about one half as much
 - petroleum
 - manganese
 - iron ore
 - lead

2.....
- Compared to the United States, other free countries used more
 - petroleum
 - rubber
 - zinc
 - copper

3.....
- The United States was using up most rapidly its known reserves of
 - petroleum
 - lead
 - zinc
 - copper

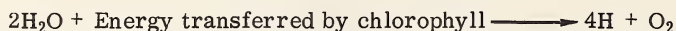
4.....
- Compared to other free countries, the United States was using up its iron (Fe) reserves about
 - 50 times as fast
 - 33 times as fast
 - 5.9 times as fast
 - 0.18 times as fast

5.....

B. Read carefully the following paragraphs; then complete statements 6 to 10.

The entire process of photosynthesis consists of three successive phases, each of which probably involves several or many specific chemical reactions. The exact number and nature of all the steps within each phase are not yet known.

In the first phase, the radiant energy trapped by chlorophyll is used to split water molecules:



The oxygen, O_2 , is liberated as a stable molecule. The hydrogen atoms, H, however, are in an unstable, highly reactive condition. They immediately combine (through a series of steps) with carbon dioxide, CO_2 , to form a sugarlike compound with three carbon atoms in its molecule. That is the second phase of photosynthesis. The third phase, again involving a series of steps, is the transformation of the three-carbon compound into a simple sugar, glucose, with six carbon atoms in the molecule: $\text{C}_6\text{H}_{12}\text{O}_6$.

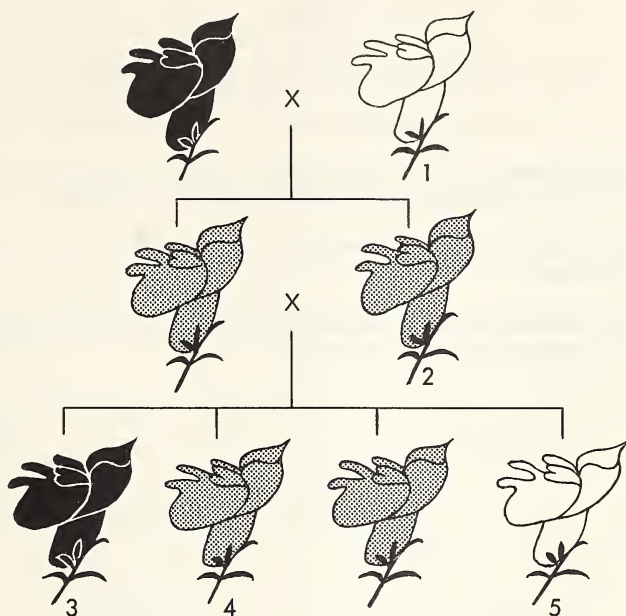
External energy comes into this sequence in the first phase only. That phase requires sunlight and chlorophyll. In later phases chlorophyll is not involved, and the energy originally trapped by it is passed along until it finally is incorporated in the stable, energy-rich basic food, glucose.

From G. Simpson, C. Pittendrigh, and L. Tiffany, *Life: An Introduction to Biology*, Harcourt, Brace and Company, Inc., 1958, p. 100.

6. According to this selection, the entire process of photosynthesis involves only three
a. chemicals
b. energy stages
c. chemical reactions
d. successive phases 6.....
7. In the equation above, two molecules of water split into a molecule of oxygen and
a. one hydrogen atom
b. one hydrogen molecule
c. four atoms of hydrogen
d. four molecules of hydrogen 7.....
8. Chlorophyll is involved in the stage of photosynthesis in which
a. water molecules split
b. hydrogen combines with carbon dioxide
c. oxygen combines with carbon dioxide
d. a three-carbon compound is changed into glucose 8.....
9. The number of oxygen atoms in a molecule of glucose is
a. 1
b. 6
c. 12
d. 24 9.....
10. During photosynthesis the energy of sunlight is trapped and passed along until finally it is stored in
a. chlorophyll
b. oxygen
c. three-carbon compounds
d. glucose 10.....

[TEST OF INTERPRETATION 3 (UNITS 5 AND 6) continued]

- C. Study the diagram below of the inheritance of color in snapdragons; then complete statements 11 to 15.



1. In snapdragons all pink flowers are
 - a. dominant
 - b. recessive
 - c. hybrids
 - d. mutants
- 11.....
2. In the diagram, pure-line snapdragons are labeled
 - a. 1 and 2
 - b. 1 and 3
 - c. 2 and 4
 - d. 4 and 5
- 12.....
3. A cross between snapdragons 1 and 5 would produce
 - a. only white snapdragons
 - b. only pink snapdragons
 - c. only red snapdragons
 - d. red, pink, and white snapdragons
- 13.....
4. In snapdragons the trait for flower color is determined by
 - a. petals
 - b. chloroplasts
 - c. genes
 - d. sunlight
- 14.....
5. In a cross between snapdragons 3 and 5, all the offspring
 - a. may be red
 - b. must be red
 - c. may be pink
 - d. must be pink
- 15.....

D. Below are listed four devices used in atomic research or in the production of atomic energy. In each numbered space at the right of statements 16 to 20, write the letter of the device described.

- a. heat exchanger
- b. Geiger counter
- c. cyclotron
- d. atomic pile

- | | |
|--|--------|
| 16. A device in which controlled chain reactions result in the formation of plutonium. | 16.... |
| 17. A device used to trace radioactive phosphorus in the study of plant growth. | 17.... |
| 18. That part of an atomic-powered submarine engine in which a special, hot, circulating liquid enters a tank and turns nonradioactive water into steam. | 18.... |
| 19. The nuclear reactor of the land-based atomic plant that operates an electric power station at Shippingport, Pennsylvania. | 19.... |
| 20. A device that greatly speeds up atomic particles traveling in a spiral path so that they may be used to study the nature of the atom. | 20.... |

CHAPTER 22: Using Simple Machines

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. Most of the energy used on the earth can be traced back to
 - a. fire
 - b. water
 - c. the sun
 - d. the wind1.....
2. Ball bearings and lubricating oil are used to reduce
 - a. weight
 - b. energy
 - c. gravity
 - d. friction2.....
3. A rock at the top of a high mountain has
 - a. stored energy
 - b. energy of motion
 - c. radiant energy
 - d. mechanical energy3.....
4. Machines help us by
 - a. losing energy
 - b. saving work
 - c. decreasing power
 - d. multiplying force4.....
5. "The capacity to do work" is one way of describing
 - a. power
 - b. energy
 - c. a machine
 - d. a force5.....
6. Work is usually measured in
 - a. foot-pounds
 - b. ounce-seconds
 - c. feet per second
 - d. pounds per second6.....
7. A doorknob is an example of the
 - a. lever
 - b. screw
 - c. wheel and axle
 - d. block and tackle7.....
8. The point of support of a lever is its
 - a. resistance
 - b. fulcrum
 - c. load
 - d. force8.....
9. Work is done
 - a. when an object is moved
 - b. by potential energy
 - c. whenever a force is exerted
 - d. by legs supporting a table9.....
10. You are using an inclined plane when you use a
 - a. crowbar
 - b. wheelbarrow
 - c. fishing pole
 - d. ramp10.....
11. One energy transformation that takes place when coal burns is the change of
 - a. radiant energy to potential energy
 - b. heat energy to mechanical energy
 - c. chemical energy to heat energy
 - d. kinetic energy to electrical energy11.....
12. Because of friction it is impossible to have a machine with an efficiency of
 - a. 50 per cent
 - b. 75 per cent
 - c. 90 per cent
 - d. 100 per cent12.....

13. The machine that is most closely related to the screw is the
 a. movable pulley
 b. inclined plane
 c. wheel and axle
 d. wedge
14. Using a single fixed pulley, you can support a weight of 50 pounds by pulling with a force of about
 a. 10 pounds
 b. 25 pounds
 c. 50 pounds
 d. 100 pounds
15. Neglecting friction, the work put into a machine, compared to that done by the machine, is
 a. exactly the same
 b. either more or less
 c. always more
 d. always less
16. If you use a lever to raise a 10-pound box through a distance of 1 foot, the work done is
 a. 10 pounds \times 1 foot
 b. $\frac{10 \text{ pounds}}{1 \text{ foot}}$
 c. 10 pounds + 1 foot
 d. $\frac{1 \text{ foot}}{10 \text{ pounds}}$
17. The mechanical advantage of the machine at the right is
 a. 1
 b. 2
 c. 3
 d. 4
18. The rate at which a machine does work is its
 a. efficiency
 b. inertia
 c. mechanical advantage
 d. power
19. To move a box up an inclined plane, a boy has to work against each of the following except
 a. mechanical energy
 b. inertia
 c. gravity
 d. friction
20. The efficiency of any machine is the useful work of the machine
 a. divided by the force put in
 b. divided by the work put in
 c. multiplied by the force put in
 d. multiplied by the work put in



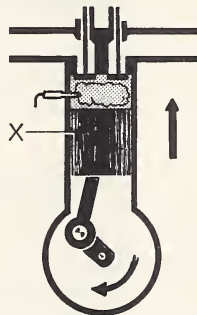
CHAPTER 23: Getting Energy from Fuels

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. Diesel engines are most useful in
 - a. automobiles
 - b. locomotives
 - c. airplanes
 - d. helicopters1.....
2. Automobile exhaust contains a small amount of the poisonous gas
 - a. hydrogen monoxide
 - b. hydrogen dioxide
 - c. carbon monoxide
 - d. carbon dioxide2.....
3. A fuel that is too dangerous to use in the home is
 - a. gasoline
 - b. natural gas
 - c. kindling wood
 - d. coal3.....
4. The first practical steam engine, which marked the start of the Industrial Revolution, was made by
 - a. Fulton
 - b. Parsons
 - c. Watt
 - d. Stephenson4.....
5. Hero's steam engine was turned by the force of steam pushing away from
 - a. a piston
 - b. a flywheel
 - c. turbine blades
 - d. bent tubes5.....
6. Most of our common fuels contain
 - a. hydrogen and nitrogen
 - b. oxygen and nitrogen
 - c. carbon and hydrogen
 - d. nitrogen and carbon6.....
7. If equal weights of our common fuels are burned, there is no difference in
 - a. the speed with which they burn
 - b. the amount of oxygen they use
 - c. the heat energy released
 - d. their kindling temperatures7.....
8. In Newcomen's engine the force with which water is raised from coal mines is actually that of
 - a. expanding steam
 - b. exploding gasoline
 - c. a gas turbine
 - d. atmospheric pressure8.....
9. The amount of work done in one second by a machine working at the rate of one horsepower is
 - a. 33,000 foot-pounds
 - b. 550 foot-pounds
 - c. 330 foot-pounds
 - d. 110 foot-pounds9.....
10. Among the following, the material with the highest kindling temperature is
 - a. coal
 - b. kindling wood
 - c. paper
 - d. match-head chemicals10.....
11. The power of a gasoline engine comes from the force of
 - a. evaporating gasoline
 - b. expanding gases
 - c. condensed gasoline
 - d. compressed gases11.....
12. An example of an internal combustion engine is the
 - a. Diesel engine
 - b. steam engine
 - c. water turbine
 - d. steam turbine12.....

13. Water in the form of steam is produced when we burn
 a. coke c. carbon
 b. nitrogen d. hydrogen 13..
14. Carbon monoxide quickly stops the proper functioning of the
 a. liver c. red cells
 b. kidneys d. arteries 14..
15. Each of the following is true of a gas turbine except that it
 a. spins at high speed c. has several blades
 b. has moving pistons d. develops high temperatures 15..
16. The cork will pop out of a test tube of boiling water because
 a. steam exerts a force c. condensed water forms
 b. the water boils d. a vacuum forms 16..
17. If you weigh 100 pounds and walk up a 10-foot stairway in 5 seconds, you develop a power of
 a. 5,000 foot-pounds per second c. 200 foot-pounds per second
 b. 1,000 foot-pounds per second d. 50 foot-pounds per second 17..

Study carefully the following diagram; then complete statements 18 to 20.



18. The diagram shows a one-cylinder gasoline engine during the
 a. intake stroke c. power stroke
 b. compression stroke d. exhaust stroke 18..
19. The part labeled X in the diagram is the
 a. piston c. flywheel
 b. cylinder d. exhaust valve 19..
20. A part in this engine that you would not find in a Diesel engine is the
 a. connecting rod c. intake valve
 b. exhaust valve d. spark plug 20..

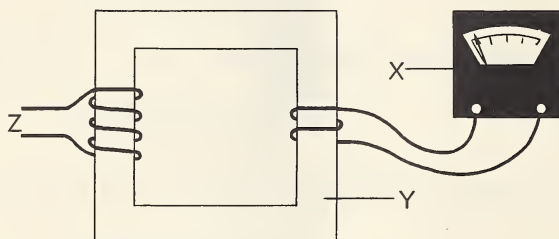
CHAPTER 24: Harnessing the Electron

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. Current electricity is a flow of
 - a. friction
 - b. neutrons
 - c. electrons
 - d. protons1.....
2. To prevent a circuit from becoming overloaded, use a
 - a. fuse
 - b. switch
 - c. voltmeter
 - d. "short" circuit2.....
3. In an electric toaster the wire that glows red-hot is made of
 - a. tungsten
 - b. carbon
 - c. copper
 - d. nichrome3.....
4. Electricity flowing from a dry cell flows from the
 - a. zinc can
 - b. manganese dioxide
 - c. copper plate
 - d. carbon pole4.....
5. To make an electromagnet, you need each of the following except
 - a. an iron core
 - b. a field magnet
 - c. coils of wire
 - d. an electric current5.....
6. Fliers and ship captains must remember that the north end of a compass needle points to the
 - a. south geographic pole
 - b. north geographic pole
 - c. south magnetic pole
 - d. north magnetic pole6.....
7. When a hard rubber rod is rubbed with fur, electrons pass from the fur to the rod and make the rod
 - a. magnetically charged
 - b. electrically neutral
 - c. negatively charged
 - d. positively charged7.....
8. Cutting magnetic lines of force with a wire produces
 - a. an electric current
 - b. a magnetic field
 - c. a spark
 - d. static electricity8.....
9. A modern light bulb differs least from the Edison bulb in its
 - a. frosted globe
 - b. base
 - c. filament wire
 - d. argon gas filler9.....
10. One advantage of a storage battery over a dry cell is that the storage battery
 - a. is lighter
 - b. uses chemical action
 - c. has its acid replaced
 - d. can be recharged10.....
11. The scientist who discovered that a wire through which electricity is flowing is surrounded by a magnetic field was
 - a. Gilbert
 - b. Faraday
 - c. Oersted
 - d. Galvani11.....
12. The huge generators at Niagara Falls are not used to generate
 - a. current electricity
 - b. static electricity
 - c. alternating current
 - d. direct current12.....

13. If a positively charged rod is brought near a neutral pith ball, the pith ball will be
 a. first attracted, then repelled
 b. first repelled, then attracted
 c. neither attracted nor repelled
 d. attracted only 13.
14. Electrical energy is changed into mechanical energy in
 a. a fluorescent tube
 b. a dynamo
 c. a motor
 d. electroplating 14.
15. The strength of the current from a generator depends on each of the following except the
 a. strength of the magnetic field
 b. number of coils in the armature
 c. speed of the armature
 d. use of a split ring 15.
16. The amount of electricity flowing through a wire is measured in
 a. watts
 b. volts
 c. resistance
 d. amperes 16.
17. In house wiring, lamps and electric appliances are usually connected
 a. in series
 b. in parallel
 c. to a 220-volt line
 d. to a 2,200-volt line 17.
18. If you bring the north poles of two freely swinging bar magnets close together, the
 a. magnets repel each other
 b. magnets attract each other
 c. lines of force disappear
 d. magnetic fields disappear 18.

Study carefully the following diagram; then complete statements 19 and 20.

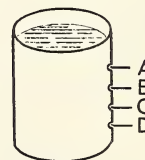


19. The device labeled Y is a
 a. kilowatt-hour meter
 b. dynamo
 c. generator
 d. transformer 19.
20. When the wires labeled Z are connected to a 220-volt source of current, the dial of the device labeled X reads about
 a. 2,200 volts
 b. 220 volts
 c. 110 volts
 d. 55 volts 20.

CHAPTER 25: Modern Pack Horses

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. The first automobile was made by
 - a. Archimedes
 - b. the Duryeas
 - c. the Fords
 - d. Bernoulli1.....
2. Most heavy industrial freight is transported by
 - a. truck
 - b. ship
 - c. rail
 - d. airplane2.....
3. Jet airplanes fly forward as hot gases push
 - a. backward
 - b. forward
 - c. upward
 - d. downward3.....
4. The automobile part that allows the two rear wheels to move at different speeds is the
 - a. clutch
 - b. transmission
 - c. gear-shift lever
 - d. differential4.....
5. The two most important safety features of modern cars are
 - a. the brakes and the automatic shift
 - b. the horn and the lights
 - c. the horn and the automatic shift
 - d. the lights and the brakes5.....
6. A submarine and its crew can stay under water for weeks if the submarine has an atomic engine and
 - a. a snorkel
 - b. a Diesel engine
 - c. compressed air
 - d. propellers6.....
7. As the speed of moving air increases, its pressure
 - a. does not change
 - b. increases
 - c. decreases
 - d. becomes zero7.....
8. The force, generated by propellers, that moves an airplane forward is
 - a. thrust
 - b. drag
 - c. lift
 - d. gravity8.....
9. If the tin can shown at the right were filled with water, a stream of water would spurt farthest out of a hole at the point labeled
 - a. A
 - b. B
 - c. C
 - d. D9.....
10. One advantage of the helicopter over other airplanes is that it
 - a. can fly faster
 - b. can fly vertically
 - c. has a greater flying range
 - d. has a greater cargo capacity10.....
11. A turbo-prop airplane, unlike a turbo-jet airplane, has
 - a. propellers
 - b. turbines
 - c. compressors
 - d. combustion chambers11.....



12. A pilot can "bank" his plane or make a sharp turn by moving the
 a. stabilizers c. ailerons
 b. propellers d. elevators 12..
13. As a pearl diver returns to the surface of the water, the pressure on him
 a. increases c. remains the same
 b. decreases d. first increases, then decreases 13..
14. A nonmovable part of an airplane is the
 a. rudder c. landing gear
 b. landing flap d. fuselage 14..
15. In order to float, a ship weighing 20,000 tons must displace
 a. less than 20,000 tons of water c. more than its own volume of water
 b. exactly 20,000 tons of water d. its own volume of water 15..
16. As a submarine submerges,
 a. water enters the ballast tanks c. the Kingston valves are closed
 b. air enters the ballast tanks d. the vent valves are closed 16..
17. The greatest depth to which a submarine can go depends on the
 a. angle of attack c. shock waves
 b. water pressure d. ram-jet engines 17..
18. A plane passes through the sound barrier at a speed of about
 a. 100 miles per hour c. 750 miles per hour
 b. 400 miles per hour d. 1,500 miles per hour 18..

Read carefully the following paragraph; then complete statements 19 and 20.

After deciding to study "floating," Fred looked in a physics book to find the weight of one cubic foot of certain liquids and solids. He found the following information:

<u>Liquids</u>		<u>Solids</u>	
Mercury	848.6 pounds	Lead	705.1 pounds
Carbon tetrachloride	99.8 pounds	Cork	15.0 pounds
Water	62.4 pounds		
Gasoline	45.0 pounds		

19. From this information Fred knew that lead will float in
 a. mercury c. water
 b. carbon tetrachloride d. gasoline 19..
20. Among the liquids listed above, the one in which a cork will sink the deepest is
 a. mercury c. water
 b. carbon tetrachloride d. gasoline 20..

NIT 7: Doing the World's Work

ect the term that best completes each of the following statements. Then place in the numbered
e at the right the letter that is in front of the term.

"Lift" and "drag" are terms used in the operation of

- | | | |
|----------------|--------------|--------|
| a. an airplane | c. a motor | |
| b. a generator | d. a turbine | 1..... |

The sloping board used by truckmen to roll barrels from the street to a truck is

- | | | |
|---------------------|----------------------|--------|
| a. a movable pulley | c. an inclined plane | |
| b. a lever | d. a wheel and axle | 2..... |

The first known steam engine was built by

- | | | |
|---------|-------------|--------|
| a. Watt | c. Savery | |
| b. Hero | d. Newcomen | 3..... |

If a rubber rod has a negative charge, the rod has received extra

- | | | |
|--------------|-------------|--------|
| a. protons | c. neutrons | |
| b. electrons | d. nuclei | 4..... |

You do work whenever you

- | | | |
|-----------------|--------------------------------|--------|
| a. push or pull | c. have a mechanical advantage | |
| b. use force | d. move an object | 5..... |

When the south poles of two magnets are brought near each other, the magnets

- | | | |
|----------------------------|---|--------|
| a. only repel each other | c. either attract or repel each other | |
| b. only attract each other | d. neither attract nor repel each other | 6..... |

The flaps at the rear edge of airplane wings are the

- | | | |
|----------------|--------------|--------|
| a. stabilizers | c. elevators | |
| b. ailerons | d. rudders | 7..... |

When gasoline burns completely, it forms

- | | | |
|------------------------------|--------------------------------|--------|
| a. carbon and hydrogen | c. carbon dioxide and water | |
| b. carbon monoxide and water | d. carbon dioxide and hydrogen | 8..... |

The point about which a lever turns is its

- | | | |
|------------|----------|--------|
| a. fulcrum | c. pitch | |
| b. pulley | d. axle | 9..... |

Machines are used to multiply

- | | | |
|----------|-------------------------|---------|
| a. power | c. mechanical advantage | |
| b. force | d. work | 10..... |

The pressure of an electric current is measured in

- | | | |
|--------------|------------|---------|
| a. watts | c. amperes | |
| b. kilowatts | d. volts | 11..... |

Ability to do work is one way of describing

- | | | |
|---------------|-----------|---------|
| a. power | c. energy | |
| b. efficiency | d. force | 12..... |

13. The Diesel engine resembles the gasoline engine in that both
 - a. burn the same type of fuel
 - b. have four strokes per cycle
 - c. use spark plugs
 - d. use Kingston valves13.
14. Neglecting friction in a block and tackle, the number of ropes directly supporting the weight is exactly equal to the machine's
 - a. mechanical advantage
 - b. power
 - c. output
 - d. efficiency14.
15. The forward thrust of a turbo-jet is generated by
 - a. compressors
 - b. propellers
 - c. escaping gases
 - d. turbines15.
16. The efficiency of a machine is usually expressed in
 - a. kilowatt-hours
 - b. foot-pounds
 - c. pounds
 - d. per cent16.
17. As you dive deeper into water, the pressure on your eardrums
 - a. increases
 - b. decreases
 - c. first decreases, then increases
 - d. neither decreases nor increases17.
18. The common storage battery, unlike the dry cell, contains
 - a. carbon
 - b. lead
 - c. zinc
 - d. nichrome18.
19. The four strokes of the four-cycle engine include each of the following except
 - a. an intake stroke
 - b. an exhaust stroke
 - c. a power stroke
 - d. an ignition stroke19.
20. In an automobile the power of the engine can be stopped from reaching the rear wheels by using the
 - a. differential
 - b. transmission
 - c. clutch
 - d. steering wheel20.
21. In one minute a machine working at the rate of one horsepower does
 - a. 222 foot-pounds of work
 - b. 550 foot-pounds of work
 - c. 2,000 foot-pounds of work
 - d. 33,000 foot-pounds of work21.
22. The simplest engine, with the fewest moving parts, is the
 - a. Diesel engine
 - b. gasoline engine
 - c. ram-jet
 - d. turbo-jet22.
23. The part of a one-cylinder gasoline engine that does not move is the
 - a. cylinder
 - b. intake valve
 - c. flywheel
 - d. piston23.
24. A DC generator contains each of the following parts except
 - a. an armature
 - b. an electromagnet
 - c. a turbine
 - d. split rings24.
25. Among the following, the term that does not belong with the others is
 - a. sound barrier
 - b. propeller blades
 - c. shock waves
 - d. 760 miles per hour25.
26. Two objects having opposite electric charges
 - a. do not affect each other
 - b. first repel and then attract each other
 - c. only attract each other
 - d. only repel each other26.

IT 7 TEST, continued]

Electric fuses are made of an alloy that has a

- | | | |
|-----------------------------|-------------------------------|---------|
| a. low kindling temperature | c. high electrical resistance | |
| b. low melting point | d. high magnetic field | 27..... |

To lift a 10-pound box through a distance of 5 feet, you do

- | | | |
|--------------------------|---------------------------|---------|
| a. 2 foot-pounds of work | c. 15 foot-pounds of work | |
| b. 5 foot-pounds of work | d. 50 foot-pounds of work | 28..... |

Of the following, each is an internal combustion engine except the

- | | | |
|------------------|----------------------|---------|
| a. steam turbine | c. gasoline engine | |
| b. gas turbine | d. turbo-prop engine | 29..... |

The energy stored in gasoline is in the form of

- | | | |
|----------------------|--------------------|---------|
| a. mechanical energy | c. chemical energy | |
| b. radiant energy | d. heat energy | 30..... |

The work you get out of a machine is always less than the work you put into it because of

- | | | |
|-------------|---------------|---------|
| a. inertia | c. efficiency | |
| b. friction | d. gravity | 31..... |

If a transformer that steps down a voltage of 2,200 volts to 110 volts has one turn in the second coil, the first coil has

- | | | |
|--------------|----------------|---------|
| a. 20 turns | c. 200 turns | |
| b. 110 turns | d. 1,100 turns | 32..... |

An object that floats on water displaces

- | | | |
|--------------------------------------|--------------------------------------|---------|
| a. more than its own volume of water | c. more than its own weight of water | |
| b. its own volume of water | d. its own weight of water | 33..... |

If when one light on your Christmas tree goes out all the others go out, the lights must be connected

- | | | |
|----------------|---------------------------|---------|
| a. in parallel | c. to direct current | |
| b. in series | d. to alternating current | 34..... |

One reason why there is greater pressure underneath than above an airplane wing during flight is that the air on the underside

- | | | |
|--------------------------------|------------------------------|---------|
| a. remains close to the wing | c. is traveling more slowly | |
| b. exerts pressure only upward | d. is traveling more rapidly | 35..... |

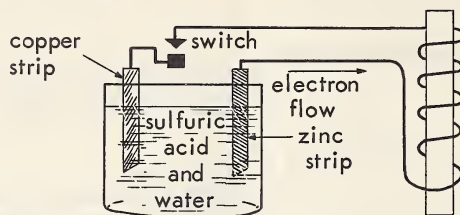
When a submarine is beneath the surface of the water, the pressure on the submarine is

- | | | |
|---------------------------------------|---------------------------------------|---------|
| a. greatest in the upward direction | c. greatest in the sideways direction | |
| b. greatest in the downward direction | d. equal in all directions | 36..... |

If a boy does 44,000 foot-pounds of work in 4 minutes, his power is

- | | | |
|------------------------------|-----------------------------------|---------|
| a. 20 foot-pounds per minute | c. 11,000 foot-pounds per minute | |
| b. 80 foot-pounds per minute | d. 176,000 foot-pounds per minute | 37..... |

Study carefully the diagram below; then complete statements 38 to 40.



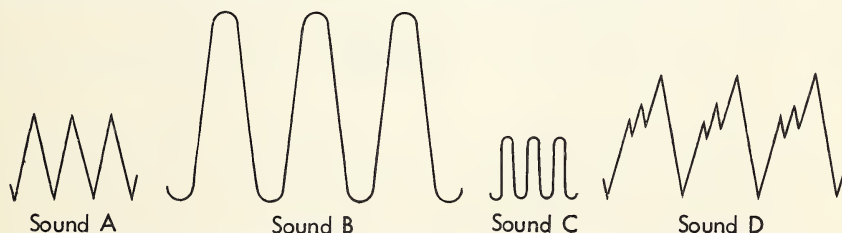
38. The source of current in the diagram is
 a. a voltaic cell
 b. an electroplating cell
 c. a transformer
 d. a dynamo 38.
39. The direction of the electron flow shows that
 a. no chemical action occurs
 b. the acid supplies the electrons
 c. the copper strip is the negative pole
 d. the zinc strip is the negative pole 39.
40. When the switch is closed, the core around which the wire is wound
 a. forms a short circuit
 b. becomes a magnet
 c. is not affected
 d. produces static electricity 40.

CHAPTER 26: Sound and Hearing

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. Of the following, the substance through which sound travels the slowest is
 - a. water
 - b. air
 - c. wood
 - d. metal1.....
2. When you speak, air from your lungs causes vibrations in your
 - a. sinuses
 - b. Adam's apple
 - c. vocal cords
 - d. anvil2.....
3. In air the speed of sound is about
 - a. 1,100 feet per second
 - b. 1,100 miles per second
 - c. 186,000 feet per second
 - d. 186,000 miles per minute3.....
4. Sonar, which is used to detect submarines, makes use of
 - a. radio waves
 - b. resonance
 - c. echoes
 - d. octaves4.....
5. There can be no sounds on the moon because the moon
 - a. produces echoes
 - b. cannot be hit
 - c. has no life on it
 - d. has no atmosphere5.....
6. The eardrum separates the middle ear from the
 - a. inner ear
 - b. sinuses
 - c. ear canal
 - d. Eustachian tube6.....
7. The softer a sound, the smaller is its
 - a. frequency
 - b. amplitude
 - c. acoustics
 - d. quality7.....
8. Another name for the voice box is the
 - a. windpipe
 - b. hammer
 - c. stirrup
 - d. larynx8.....
9. Sounds that are beyond the range of human hearing
 - a. are not vibrations
 - b. are ultrasonic
 - c. have no pitch
 - d. have no frequency9.....

Study carefully the following diagram; then complete statements 10 and 11.



10. The instrument that is used to show sound-wave patterns like those in the diagram above is the
 - a. oscilloscope
 - b. sonar
 - c. keyboard
 - d. acoustic10.....
11. In the diagram the pattern of the loudest sound is labeled
 - a. A
 - b. B
 - c. C
 - d. D11.....

Select the term that best completes each statement.

12. The pitch of a note depends on the
a. frequency of sound waves c. resonance of sound waves
b. echoes of sound waves d. amplitude of sound waves 12.
13. The ends of the nerve fibers that carry the stimuli of sound to the brain are in the
a. bones of the middle ear c. Eustachian tube
b. eardrum d. cochlea 13.
14. If you want to cut down the echoes in a room, you should not
a. cover the walls with porous material c. move out the furniture
b. hang draperies on the walls d. call in an acoustics expert 14.
15. The human ear can hear only the sounds made by objects vibrating between
a. 12 and 16,000 times per second c. 40 and 40,000 times per second
b. 16 and 20,000 times per second d. 0 and 80,000 times per second 15.
16. The greater the number of vibrations per second the
a. higher the pitch c. louder the sound
b. lower the pitch d. softer the sound 16.
17. If thunder is heard ten seconds after a flash of lightning is seen, the storm is about
a. one-half mile away c. two miles away
b. one mile away d. ten miles away 17.
18. Middle C played on a piano can be told from Middle C played on the violin by the difference in their
a. frequency c. speed
b. quality d. amplitude 18.

Read carefully the following paragraph; then complete statements 19 and 20.

A school nurse visited the homes of four students to learn why the students were absent from school. She learned that John had a middle-ear infection, William had an earache; Joan had a punctured eardrum, and Mary's sinuses were filled with fluid.

19. The germs in John's middle ear probably came from his
a. mouth and throat c. outer ear
b. cochlea d. inner ear 19.
20. The student whose voice changed in resonance because of illness was
a. John c. Joan
b. William d. Mary 20.

CHAPTER 27: Light and Sight

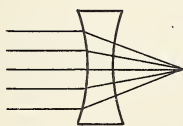
Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. The speed of light is about
 - a. 1,100 miles per second
 - b. 1,100 feet per second
 - c. 186,000 miles per second
 - d. 186,000 feet per second1.....
2. For proper vision, light rays must be focused sharply on the
 - a. cornea
 - b. lens
 - c. optic nerve
 - d. retina2.....
3. The light waves with the shortest wave length make the color
 - a. violet
 - b. green
 - c. red
 - d. blue3.....
4. The scientist who showed that a ray of white light is really made up of several different light waves was
 - a. Einstein
 - b. Snellen
 - c. Michelson
 - d. Newton4.....
5. An instrument used mainly to change the direction of light so that you can see around a corner is a
 - a. reflector
 - b. periscope
 - c. prism
 - d. lens5.....
6. In bright light the pupil of the eye
 - a. becomes smaller
 - b. becomes larger
 - c. closes completely
 - d. remains unchanged6.....
7. A sheet of paper that absorbs all the rays of white light is
 - a. green
 - b. yellow
 - c. black
 - d. white7.....
8. The rules for good lighting include each of the following except
 - a. avoid glare on your work
 - b. light your task, not the area around it
 - c. avoid heavy shadows in the room
 - d. keep reflectors and lamp bulbs clean8.....

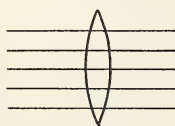
Light rays passing through a lens are drawn correctly in diagram



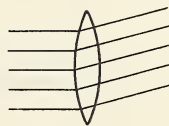
a.



b.



c.



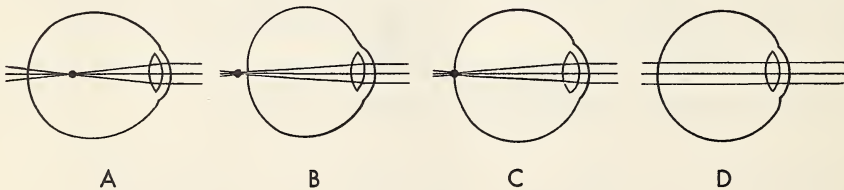
d.

9.....

10. The series of colors that appear when sunlight is passed through a prism is
 - a. an accommodation
 - b. a focus
 - c. a reflection
 - d. a spectrum10.....

11. Light rays enter the eye through the
 a. iris
 b. rods and cones
 c. pupil
 d. retina 11..
12. A piece of red cloth looks red because it
 a. absorbs all light waves
 b. absorbs red light waves
 c. reflects all light waves
 d. reflects red light waves 12..
13. When sunlight passes through a prism, the light waves that are bent the least are the
 a. blue light waves
 b. red light waves
 c. violet light waves
 d. yellow light waves 13..
14. The color made by a light ray depends on the ray's
 a. direction
 b. reflection
 c. wave length
 d. speed 14..
15. Light becomes diffused when it is reflected from a
 a. dull surface
 b. shiny surface
 c. smooth surface
 d. mirrored surface 15..
16. Our eyes are able to focus on both near and far objects because each
 a. lens can accommodate
 b. cornea has elasticity
 c. retina has rods and cones
 d. iris can change size 16..
17. A transparent part of the eye is the
 a. iris
 b. optic nerve
 c. cornea
 d. eyelid 17..
18. Light waves vibrate
 a. only up and down
 b. only back and forth
 c. neither up and down nor back and forth
 d. both up and down, and back and forth 18..

Study carefully the following diagram; then complete statements 19 and 20.



19. A nearsighted eye is shown in diagram
 a. A
 b. B
 c. C
 d. D 19..
20. The lens a doctor would use to correct the farsighted eye must be
 a. concave
 b. convex
 c. bifocal
 d. flat 20..

CHAPTER 28: Sending and Storing Signals

ect the term that best completes each of the following statements. Then place in the numbered
ice at the right the letter that is in front of the term.

The first practical telegraph was invented by

- | | | |
|-----------|--------------|--------|
| a. Bell | c. Morse | |
| b. Edison | d. Muybridge | 1..... |

When you click the shutter of your camera, the chemicals in the photographic film
are changed by

- | | | |
|----------|----------------|--------|
| a. light | c. electricity | |
| b. heat | d. sound | 2..... |

The part of a telegraph that turns the current off and on is the

- | | | |
|------------------|------------|--------|
| a. armature | c. sounder | |
| b. electromagnet | d. key | 3..... |

When a telegraph message is to be sent a great distance, it is necessary that the
telegraph line have

- | | | |
|-----------------|--------------------|--------|
| a. a relay | c. a loudspeaker | |
| b. an amplifier | d. an electric eye | 4..... |

On black-and-white photographic negatives images of light-colored objects appear

- | | | |
|----------|------------|--------|
| a. white | c. light | |
| b. black | d. colored | 5..... |

The pattern recorded on the tape of a tape recorder is

- | | | |
|----------|---------------|--------|
| a. sound | c. electrical | |
| b. light | d. magnetic | 6..... |

If a series of images is to give the effect of motion, the eye must see at least

- | | | |
|----------------------------|----------------------------------|--------|
| a. five images per second | c. sixteen images per second | |
| b. eight images per second | d. thirty-five images per second | 7..... |

Film slides and filmstrips can be made large enough to show in your classroom by
putting them into a

- | | | |
|--------------|-------------------------|--------|
| a. projector | c. transmitter | |
| b. magnifier | d. Polaroid-Land camera | 8..... |

An instrument that sends coded messages along an electric wire is the

- | | | |
|--------------|---------------|--------|
| a. telephone | c. radio | |
| b. telegraph | d. television | 9..... |

The light and dark saw-tooth pattern along one edge of motion picture film is the

- | | | |
|-------------|--------------------------|---------|
| a. positive | c. persistence of vision | |
| b. negative | d. sound track | 10..... |

The diaphragm in a telephone receiver is operated by

- | | | |
|----------------|---------------------|---------|
| a. sound waves | c. an electromagnet | |
| b. pressure | d. carbon grains | 11..... |

12. During the playback of tape recordings the current is made stronger by
a. microphones c. iron-oxide coatings 12..
b. amplifiers d. "recording heads"
13. In a telephone transmitter, when sound waves push against the diaphragm that is above the carbon grains
a. more current flows c. no current flows 13..
b. less current flows d. no change occurs
14. Some automatic door openers, burglar alarms, and exposure meters are operated by
a. transmitters c. photoelectric cells 14..
b. Telefax d. positive transparency
15. The "recording head" of a tape recorder is
a. a photoelectric cell c. a loudspeaker 15..
b. a relay d. an electromagnet
16. In a telephone conversation the wire actually carries
a. your voice c. vibrations 16..
b. pressure waves d. an electric current
17. A photoelectric cell changes
a. a light pattern into a sound pattern c. a magnetic pattern into a light pattern 17..
b. a light pattern into an electrical pattern d. an electrical pattern into a light pattern
18. When you take a photograph, the rays that enter the camera usually
a. strike negative film c. develop positive film 18..
b. are absorbed by the lens d. develop a contact print

Read carefully the following paragraph; then complete statements 19 and 20.

Betty received a hi-fi phonograph. She was disappointed to learn that she could not play stereo recordings on it even though it had an excellent twelve-inch speaker.

19. Betty could not play stereo recordings on her phonograph because they
a. are long-playing records c. have "hill and valley" grooves 19..
b. require a diamond needle d. require a double-needle system
20. Betty found that her hi-fi phonograph did away with each of the following except
a. noise c. loudspeakers 20..
b. distortion d. lack of balance

CHAPTER 29: Electronic Messengers

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. The speed of a light wave is its
a. wave length
b. velocity
c. frequency
d. oscillation
1.....
2. The number of miles an electromagnetic wave travels in one second is
a. 1,100
b. 30,000
c. 186,000
d. 300,000
2.....
3. The shortest rays or waves among the following are
a. cosmic rays
b. near infrared rays
c. visible light rays
d. hertzian waves
3.....
4. Of the following, each travels as electromagnetic waves except
a. light
b. radio waves
c. sound
d. X rays
4.....
5. "Roentgen rays" is another name for
a. middle ultraviolet rays
b. radio waves
c. gamma rays
d. X rays
5.....
6. Suntan preparations protect your skin by filtering out dangerous
a. visible light
b. violet rays
c. ultraviolet rays
d. infrared rays
6.....
7. Small bands of electromagnetic waves set aside for special purposes in broadcasting are
a. oscillations
b. channels
c. crests
d. troughs
7.....

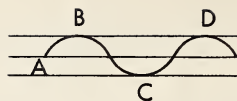
To complete statements 8 to 10, place in the numbered space at the right of each statement the letter of the type of rays described.

- a. X rays
b. infrared rays
c. ultraviolet rays
d. cosmic rays
8. Rays that come from outer space and act as if they were small particles. 8.....
9. Rays that are just below visible light in the electromagnetic spectrum—that is, have a lower frequency than visible light. 9.....
10. Rays used in industry to detect flaws in metal castings. 10.....

Select the term that best completes each statement.

1. The number of cycles per second for any wave is its
a. wave length
b. frequency
c. oscillation time
d. velocity
11.....
2. The number of cycles per second in one megacycle is
a. 1,000,000
b. 1,000
c. 100
d. 10
12.....

13. The wave length of the ray shown in the diagram at the right is the distance between points



- a. A and B
b. A and C
c. B and C
d. B and D
- 13.....
14. Barium sulfate helps in the study of the digestive system by
a. giving off radiations
b. becoming radioactive
c. stopping X rays
d. neutralizing stomach acid
- 14.....
15. An instrument used to identify substances by a study of the vibrations of their molecules is the
a. electroscope
b. infrared spectrophotometer
c. cold-light panel
d. black-light camera
- 15.....
16. 10^5 is another way of writing the number
a. 100,000
b. 10,000
c. 50
d. .2
- 16.....
17. Minerals that stop glowing as soon as the energy that excited them is cut off
a. give off ultraviolet rays
b. give off X rays
c. are fluorescent
d. are phosphorescent
- 17.....
18. You could use infrared rays to do each of the following except
a. guide the "Sidewinder" missile
b. reveal hidden laundry marks
c. produce large amounts of heat
d. take photographs in total darkness
- 18.....

Study carefully the following paragraph; then complete statements 19 and 20.

The equation that scientists use to relate velocity (v), frequency (f), and wave length (L) is $v = Lf$. They have learned that all electromagnetic waves have the same velocity.

19. If you want to find the wave length of an electromagnetic wave, use the formula
a. $L = \frac{v}{f}$
b. $L = \frac{f}{v}$
c. $f = vL$
d. $v = \frac{L}{f}$
- 19.....
20. As the frequency of an electromagnetic wave increases, its wave length
a. remains the same
b. becomes zero
c. increases
d. decreases
- 20.....

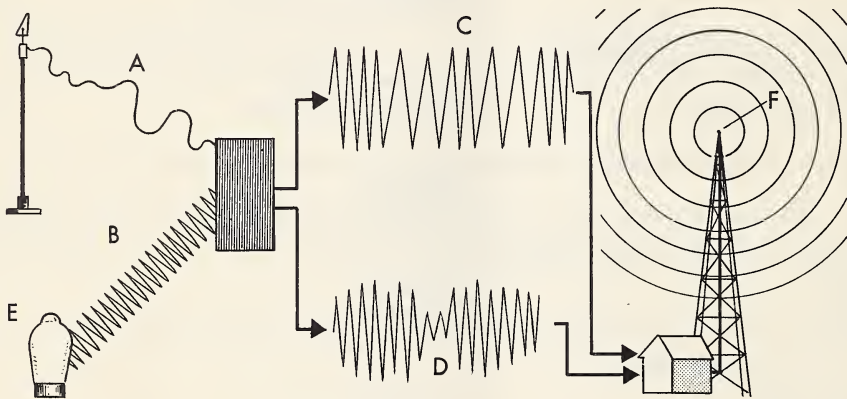
CHAPTER 30: Sending Sound and Images Through the Air

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. A radio transmitter is a device that can send out high-frequency
 - a. light waves
 - b. electromagnetic waves
 - c. picture signals
 - d. sound waves1.....
2. The scientist who discovered radio waves was
 - a. Kennelly
 - b. DeForest
 - c. Hertz
 - d. Heaviside2.....
3. The 500-kilocycle radio channel is reserved for
 - a. distress signals
 - b. amateurs
 - c. the Civil Air Patrol
 - d. the police department3.....
4. The Federal Communications Commission has assigned the lowest-frequency broadcasting bands to
 - a. radar
 - b. television
 - c. FM broadcasting
 - d. standard broadcasting4.....
5. The tuning device of a radio is used to
 - a. amplify voice current
 - b. block the carrier current
 - c. mix frequencies
 - d. select a frequency5.....
6. The modification of carrier waves by voices or music is
 - a. modulation
 - b. filtering
 - c. detection
 - d. amplifying6.....
7. Among the following, the term that includes all the others is
 - a. vacuum tube
 - b. radio crystal
 - c. detector
 - d. transistor7.....
8. The screen of a TV camera tube is
 - a. a photoelectric cell
 - b. a photographic film
 - c. a phosphor
 - d. an electron gun8.....
9. Color television makes use of
 - a. different cameras for each color
 - b. carrier waves of many colors
 - c. a two-color system
 - d. a three-color system9.....
10. In amplitude modulation we change the
 - a. frequency of the carrier wave
 - b. strength of the carrier wave
 - c. cycles of the carrier wave
 - d. velocity of the carrier wave10.....
11. GCA, used in landing aircraft, makes use of
 - a. radar
 - b. television
 - c. AM radio
 - d. FM radio11.....
12. In the antenna of a radio receiver there are induced currents
 - a. of only one frequency
 - b. of only low frequencies
 - c. from all nearby radio stations
 - d. from distant television stations12.....

13. Among the following, the one that makes use of all the others is
 a. blip c. pulse
 b. radar d. cathode-ray tube 13...
14. A radio signal that is reflected back to earth by the ionosphere is a
 a. "ghost" c. "radio roof"
 b. target d. sky wave 14...
15. On a black-and-white television screen each picture is made up
 a. of 600 dots c. of 30 small pictures
 b. of 525 lines d. for 1 second 15...
16. FM radio signals, unlike AM radio signals, usually
 a. travel only about 75 miles c. curve around the earth
 b. are reflected by the ionosphere d. are greatly affected by static 16...
17. Most radio sets are tuned by changing the
 a. detector c. antenna
 b. condenser d. resonator 17...

Study carefully the following diagram of a radio broadcasting station; then complete statements 18 to 20.



18. In the diagram the carrier wave of an FM radio signal is labeled
 a. A c. C
 b. B d. D 18...
19. The part of the diagram labeled E is
 a. a vacuum-tube oscillator c. an amplifier
 b. a vacuum-tube detector d. an electron gun 19...
20. The electromagnetic waves sent out from the point labeled F are picked up by
 a. induction coil c. capacitor
 b. filter d. antenna 20...

UNIT 8: Speeding Communication

Select the term that best completes each of the following statements. Then place in the numbered space at the right the letter that is in front of the term.

1. The speed of light waves is greater than that of

a. infrared rays	c. sound waves	
b. ultraviolet rays	d. radio waves	1.....
2. Among the following, the best carrier of sound is

a. air	c. wood	
b. iron	d. water	2.....
3. A doctor could locate a broken bone in your arm by using

a. X rays	c. gamma rays	
b. hertzian waves	d. cosmic rays	3.....
4. The light-sensitive cells of the eye are in the

a. cornea	c. pupil	
b. retina	d. iris	4.....
5. Vibrations of the eardrum are transmitted to the fluid in the cochlea

a. through the ear canal	c. by nerve fibers	
b. through the Eustachian tube	d. by three small bones	5.....
6. The rays that can cause sunburn are

a. ultraviolet rays	c. visible light rays	
b. infrared rays	d. cosmic rays	6.....
7. The science of sound is

a. resonance	c. acoustics	
b. ultrasonics	d. vibrations	7.....
8. The color produced by a light ray depends on the ray's

a. amplitude	c. speed	
b. quality	d. wave length	8.....
9. The first phonograph was invented by

a. Bell	c. Edison	
b. Eastman	d. Marconi	9.....
10. Radar and sonar both make use of

a. electromagnetic waves	c. radio waves	
b. reflected waves	d. sound waves	10.....
11. When the carbon particles in a telephone transmitter are pressed together, the flow of current is

a. increased	c. stopped	
b. decreased	d. not changed	11.....
12. A radio station using 900 kilocycles sends out

a. 900 waves per second	c. 90,000 waves per second	
b. 9,000 waves per second	d. 900,000 waves per second	12.....

13. If frequencies of 10, 1,000, 10,000, and 15,000 vibrations per second were used in a hearing test, persons with normal hearing would hear
 - a. only one of these
 - b. only two of these
 - c. only three of these
 - d. all four frequencies13....
14. Light with the longest wave length produces the color
 - a. red
 - b. green
 - c. black
 - d. violet14....
15. The lens used to correct nearsightedness is
 - a. convex
 - b. concave
 - c. bifocal
 - d. binocular15....
16. The relay used in telegraph systems is actually
 - a. a capacitor
 - b. a transistor
 - c. an electron gun
 - d. a switch16....
17. The difference between phosphorescence and fluorescence is that phosphorescent materials glow
 - a. by giving off cold light
 - b. by giving off black light
 - c. after the exciter is turned off
 - d. only while the exciter is on17....
18. The louder a sound the greater is its
 - a. amplitude
 - b. resonance
 - c. number of echoes
 - d. number of vibrations18....
19. The wave that brings signals from the antenna of a radio transmitter to the antenna of a receiver is a
 - a. modified carrier wave
 - b. voice or music wave
 - c. sound wave
 - d. light wave19....
20. The lightest part of a photographic negative that includes all of the following objects is the
 - a. gray house
 - b. black wall
 - c. white hat
 - d. light yellow dress20....
21. When a prism is used to break white light into its spectrum, the rays that are bent the most are the
 - a. red rays
 - b. green rays
 - c. blue rays
 - d. violet rays21....
22. An eye defect that may be due to the eyeball being too short is
 - a. farsightedness
 - b. nearsightedness
 - c. astigmatism
 - d. cross-eyedness22....
23. For radio waves, the ionosphere serves as
 - a. an oscillator
 - b. an amplifier
 - c. a condenser
 - d. a reflector23....
24. Photoelectric cells are an important part of
 - a. tape recorders
 - b. sound movie projectors
 - c. FM radios
 - d. AM transmitters24....
25. Of the following, the first rays that are out of order in terms of decreasing wave length are
 - a. radio waves
 - b. visible light rays
 - c. X rays
 - d. ultraviolet rays25....

NIT 8 TEST, continued

Tuning a radio is usually done by regulating the

- | | | |
|-------------------|---------------|---------|
| a. induction coil | c. filter | |
| b. condenser | d. oscillator | 26..... |

Grass looks green in daylight because the grass

- | | | |
|-------------------------------|-----------------------------|---------|
| a. reflects green light waves | c. reflects all light waves | |
| b. absorbs green light waves | d. absorbs all light waves | 27..... |

The pitch of a sound depends on its

- | | | |
|-------------|--------------|---------|
| a. quality | c. frequency | |
| b. loudness | d. speed | 28..... |

An instrument that changes sound waves into waves of light on a screen is the

- | | | |
|---------------------|-----------------|---------|
| a. cathode-ray tube | c. electroscope | |
| b. radar tube | d. oscilloscope | 29..... |

You will not enjoy listening to records at home if your phonograph

- | | | |
|---------------------------|-------------------------------|---------|
| a. plays "stereo" records | c. is a "hi-fi" set | |
| b. increases distortion | d. plays long-playing records | 30..... |

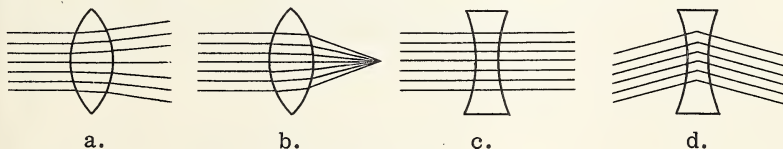
10^6 is equal to

- | | | |
|-------------------|------------------------|---------|
| a. $\frac{6}{10}$ | c. $\frac{1}{100,000}$ | |
| b. 60 | d. 1,000,000 | 31..... |

Of the following, each could serve as the detector of a radio set except a

- | | | |
|----------------|-----------------------|---------|
| a. crystal | c. photoelectric cell | |
| b. vacuum tube | d. transistor | 32..... |

Light rays passing through a lens are drawn correctly in diagram



33.....

The color of an object that reflects all wave lengths of light is

- | | | |
|----------|----------|---------|
| a. black | c. red | |
| b. green | d. white | 34..... |

An advantage of FM over AM is that FM radio waves

- | | | |
|---------------------------------|------------------------------------|---------|
| a. avoid most effects of static | c. travel more slowly | |
| b. have greater range | d. can pass through the ionosphere | 35..... |

If you erase a tape recording, you remove

- | | | |
|--------------------------|-----------------------|---------|
| a. an electrical pattern | c. a magnetic pattern | |
| b. a sound pattern | d. a light pattern | 36..... |

The wave length of a light ray can be found by

- | | | |
|---|---|---------|
| a. dividing its velocity by its frequency | c. multiplying its frequency by its velocity | |
| b. dividing its frequency by its velocity | d. multiplying its frequency by its amplitude | 37..... |

Read carefully the following paragraph; then complete statements 38 to 40 by placing in the numbered space at the right of each statement the letter of the term most closely related to the statement.

After the class studied television, the teacher asked the students to select the ideas or devices that had interested them the most. John listed the following items:

- a. phosphors
- b. electron "gun"
- c. persistence of vision
- d. photoelectric cell

- | | |
|--|-----|
| 38. The explanation of how viewers see motion. | 38. |
| 39. The source of the beam that moves from left to right across the screen
525 times each second. | 39. |
| 40. The camera part that is the first to be affected when a scene is televised. | 40. |

TEST OF INTERPRETATION 4 (Units 7 and 8)

Study carefully the following information; then complete statements 1 to 5.

Scientists use the following methods to find the mechanical advantage (M.A.) of various machines.

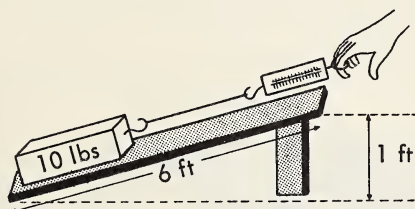
Lever: Divide the distance between the fulcrum and the point where the force is applied by the distance between the resistance and the fulcrum.

Inclined plane: Divide the length of the plane by its height.

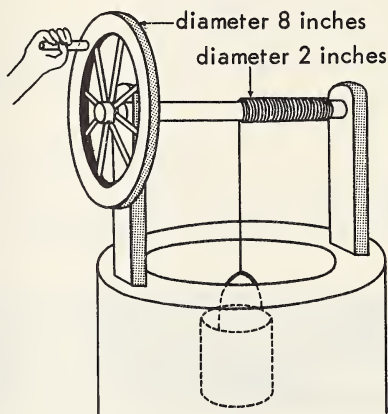
Wheel and axle: Divide the radius of the wheel by the radius of the axle.

Pulley: Count the number of ropes that directly support the weight.

(In doing these problems, neglect friction.)



I



II

The mechanical advantage of the machine in diagram I is

- | | |
|-------------------|-------|
| a. $\frac{1}{10}$ | c. 10 |
| b. 6 | d. 60 |

1.....

The M.A. of the machine in diagram II is

- | | |
|------------------|-------|
| a. $\frac{1}{4}$ | c. 4 |
| b. 2 | d. 16 |

2.....

In comparing the actual M.A. to the calculated M.A. of any machine, you will find that the actual M.A. is

- | | |
|-------------------|------------------------------------|
| a. always smaller | c. usually greater |
| b. always greater | d. the same as the calculated M.A. |

3.....

The M.A. of a single fixed pulley is

- | | |
|------------------|------|
| a. 0 | c. 1 |
| b. $\frac{1}{2}$ | d. 2 |

4.....

If you are using a lever and move the fulcrum closer to the resistance, the M.A. of the lever must

- | | |
|--------------------|-------------|
| a. remain the same | c. decrease |
| b. become 1 | d. increase |

5.....

B. In each numbered space at the right of statements 6 to 10, write the letter

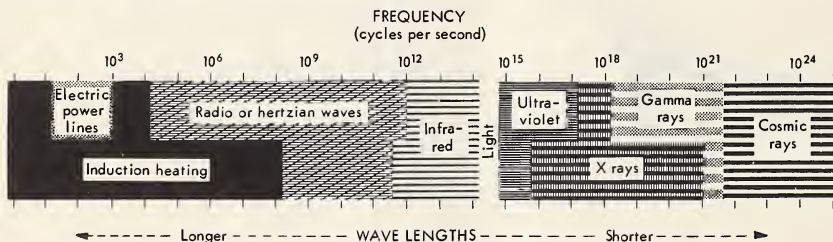
- a. if the fact or situation in Column A results from the fact or situation in Column B.
- b. if the fact or situation in Column B results from the fact or situation in Column A.
- c. if the fact or situation in Column A is the same as the fact or situation in Column B.
- d. if the fact or situation in Column A is equal and opposite to the fact or situation in Column B.

Column A

Column B

- | | | |
|--|---|-----|
| 6. The work done in lifting a 3-pound box a distance of 2 feet | 6. The work done in lifting a 2-pound box a distance of 3 feet | 6. |
| 7. The frequency of a sound wave | 7. The pitch of a sound | 7. |
| 8. The charge on a hard rubber rod rubbed with a woolen cloth | 8. The charge on the woolen cloth used to rub the hard rubber rod | 8. |
| 9. Chemical action in a dry cell | 9. A flow of electrons | 9. |
| 10. The weight of an object | 10. The force of gravity | 10. |

C. Study carefully the following diagram of the electromagnetic spectrum; then complete statements 11 to 15.



(Adapted from R. Brinckerhoff, J. Cross, and A. Lazarus, *Exploring Physics*, New Edition, Harcourt, Brace and Company, Inc., page 593.)

11. As you read from left to right in the electromagnetic spectrum above, the
 - a. frequency remains the same
 - b. frequency increases
 - c. wave length remains the same
 - d. wave length increases
12. From the diagram it appears that X rays
 - a. can have various wave lengths
 - b. can have a frequency of 10^{22}
 - c. are a type of gamma ray
 - d. are a type of ultraviolet ray
13. The frequency of radio waves with the shortest wave length is closest to
 - a. 10^3 cycles per second
 - b. 10^6 cycles per second
 - c. 10^9 cycles per second
 - d. 10^{12} cycles per second
14. The visible part of the electromagnetic spectrum is labeled
 - a. electric power lines
 - b. infrared
 - c. light
 - d. ultraviolet
15. Induction heating rays with a frequency of 10^4 vibrate at
 - a. $\frac{1}{10,000}$ cycles per second
 - b. 10,000 cycles per second
 - c. 40,000 cycles per second
 - d. 100,000 cycles per second

TEST OF INTERPRETATION 4 (UNITS 7 AND 8), continued]

6. Read carefully the following paragraph; then complete statements 16 to 20 by following the instructions below the paragraph.

Sound, which is caused by an object vibrating in air, has a speed of about 760 miles per hour. Airplanes in flight constantly send out sound waves that travel in all directions. A plane traveling at 760 miles per hour catches up with the waves it sends out ahead of itself and piles them up in front of the plane. This squeezed-together air forms shock waves that cause planes to vibrate violently. Once the plane crashes the sound barrier, these violent vibrations stop and the plane is in supersonic flight.

On the basis of the information in this paragraph, write the letter

- a. if the statement is true
- b. if the statement is probably true
- c. if the statement is false
- d. if the statement is probably false

7. A plane flying at 900 miles per hour is in supersonic flight. 16.....
8. A plane traveling at 860 miles per hour sends out sound waves that travel at a rate of 860 miles per hour. 17.....
9. The shock waves that cause a plane to vibrate as it returns through the sound barrier are about the same as those that caused it to vibrate as it crashed the sound barrier. 18.....
10. If a plane is traveling west at 200 miles per hour, the sounds it sends out travel to the east at about 12.7 miles per minute. 19.....
11. The pilot of a plane in supersonic flight is traveling in absolute silence. 20.....

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[illegible]

